Town of Gibsons
TRAFFIC CALMING MASTER PLAN
Report

Prepared for:	**Town of Gibsons**
Prepared by:	**Bunt & Associates Engineering Ltd.**
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Table of Contents

1.0 INTRODUCTION

Bunt & Associates Ltd. was commissioned by the Town of Gibsons on August 10th, 2007 to prepare a Traffic Calming Master Plan. The objectives of the Master Plan are to:

- Document the results of the public consultation process undertaken to identify problematic traffic locations throughout the Town and preferred methods of evaluating traffic calming;
- Introduce the traffic calming policy recommended for Council, Parks and Infrastructure Committee, and staff to apply to evaluate sites for traffic calming; and
- Prepare traffic calming concepts, including cost estimates, for a select number of sites identified from the previous two steps (i.e. at sites warranting traffic calming treatment).

The scope of the study was limited to the identification and preparation of a traffic calming master plan and "high-level" conceptual plans for the top 5 sites identified. In addition, no collection or analysis of traffic or speed data was included the scope of work.

The report has been organized to:

- Introduce the concept and application of traffic calming;
- Identify a master list of traffic concerns in the Town of Gibsons;
- Identify and prioritize sites appropriate for traffic calming;
- Summarize the results of the public open house;
- Present the recommended traffic calming policy; and
- Prepare recommendations to Council for the next steps of the project.

2.0 TRAFFIC CALMING

2.1 What is Traffic Calming?

The primary purpose of traffic calming is to have drivers behave appropriately to the functional classification of the road and its surrounding land uses. The Institute of Transportation Engineers (ITE) defines traffic calming as:

> *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.*

2.2 Sites for Application of Traffic Calming

The *Canadian Guide to Neighbourhood Traffic Calming* published by the Transportation Association of Canada (TAC) acknowledges the ITE definition of traffic calming, however recommends that traffic calming be applied to only local and collector residential streets. Many of the physical traffic calming measures applied to local and collector streets are inappropriate for the objectives of arterials and higher order roads in safely and efficiently moving traffic.

It is also noted that traffic calming should not be a substitute for engineering design and can not be used solely to resolve traffic and safety problems on all streets.

2.3 Traffic Calming Measures

Bunt & Associates has assembled a list of generic traffic calming devices that identifies appropriate locations, the advantages, and disadvantages associated with commonly applied traffic calming devices. This compiled information source has been included at **Appendix A**.

Canadian application of traffic calming is guided by the December 1998 TAC publication titled *Canadian Guide to Neighbourhood Traffic Calming.*

3.0 SITES FOR TRAFFIC CALMING

3.1 Public Consultation

A public open house meeting was conducted by the Town of Gibsons and Bunt & Associates on Wednesday, 3rd October, 2007 at the Gibsons' Royal Canadian Legion. The meeting was advertised through the Town of Gibsons website, the Coast Reporter, and notices at the Town Hall and subsequently displayed at the Sunnycrest Mall on Upper Gibsons Way on Friday, 12th October 2007.

The objective of the open house was to provide residents the opportunity to offer general input into traffic issues in the Town of Gibsons. In particular, the meeting provided a forum for residents to identify and rank particular areas of concern that should be the focus of traffic calming in the Town of Gibsons.

General information regarding traffic calming, specific information on the advantages and disadvantages of different types of traffic calming treatments, as provided in Appendix A, and methodologies for evaluating traffic calming sites were presented. Resident opinions on a number of topics, including preferred traffic calming measures, the preferred method to identify sites for further evaluation for traffic calming, and funding mechanisms were sought through a questionnaire, included at **Appendix B**.

3.2 Master List of Traffic Concerns

One of the objectives of the Traffic Calming Master Plan is to identify sites to be included in a Master List that would be further evaluated for the implementation of traffic calming. Sites were identified through three mechanisms:

- Input garnered from the public open house meeting;
- Staff knowledge of existing problems; and,
- Bunt staff road network and field observations.

As part of the public consultation process, attendees of the open house meeting were asked to identify and rank locations of any traffic concern, not just those which may be appropriate for application of traffic calming measures. Consequently, the feedback at the public meeting was comprehensive and included many sites where solutions to the issues identified would include actions other than traffic calming. This feedback will be valuable for Town staff in identifying future efforts for traffic and design engineering studies.

A total of 43 responses were received from residents attending the Open House or Mall presentations Residents identified traffic concerns in terms of their 1st, 2nd, and 3rd highest priorities on a pin map, along with the reason for their concern. The results of this survey are included at **Appendix C**.

The locations identified by residents, Town staff and Bunt are summarized in **Table 1,** roughly according to residents' priority allocation. Table 1 also indicates whether, in the opinion of the Project Team, the site would be a location appropriate for application of traffic calming measures or whether the site would benefit from other solutions.

Table 1: Master List of Traffic Concerns

Priority Ranking	Location	Potential Traffic Calming Location	Locations Requiring Other Solutions
1	Gower Point Road/Marine Drive/School Road intersection and the nearby Marine Drive/ Molly's Lane intersection		✓
2	Upper Gibsons Way (Hwy 101) Intersections		✓
3	Gower Point Road (numerous locations)		✓
4	South Fletcher Road	✓	
5	Headlands Road	✓	
6	School Road		✓
7	O'Shea Road (also identified by Bunt)	✓	
8	Lower Gibsons Way		✓
9	North Fletcher Road (also identified by Bunt)	✓	
10	Bay Road	✓	
11	Seaview Road	✓	
12	Marine Drive		✓
13	Glassford Road (also identified by Bunt)	✓	
14	Reed Road		✓
15	Shaw Road (identified by Town Staff)		✓

3.3 Sites Appropriate for Traffic Calming

In terms of traffic calming, the public consultation process identified possible seven potential sites that should be evaluated for traffic calming including: North Fletcher Road, Seaview Road, O'Shea Road, South Fletcher Road, Glassford Road, Headlands Road, and Bay Road. These locations are appropriate for application of traffic calming measures as they display conditions that are inappropriate for their functional classification, e.g. cut-through traffic, inappropriate speeds, etc.

While seven locations were identified as listed in Table 1, five locations stood out as sites that warranted priority for the evaluation and preparation of traffic calming, in the opinion of the project team, either due to residents' priority ranking and/or conditions confirmed during the Bunt field review. These sites are

discussed in more detail below. Conceptual traffic calming options have been prepared for these sites, which are described in the following section.

These five sites, along with the two remaining sites and others that may be identified in the future, should be entered onto a Traffic Calming Master List and be evaluated annually according to the proposed Town of Gibsons Traffic Calming Policy (detailed in the following report section).

3.4 Conceptual Plans for Priority Sites

The following tables provide information regarding each of the five priority sites. **Exhibits 1 to 5** illustrate potential traffic calming options at the priority sites, including measures which the project team believe would be appropriate. Where the options could be phased in over time, the measures in each phase have been identified.

High level cost estimate ranges have been provided on the Exhibits based on experience in other jurisdictions; note that the range of costs is quite significant. Traffic calming costs vary considerably, depending on whether:

- Additional right of way is required;
- Existing concrete curbs and/or catch basins need to be moved;
- Underground drainage needs to be altered; and,
- The level of landscaping or special materials that are used.

In order to better understand these variables, a functional/preliminary design based upon detailed mapping must be prepared, which is beyond the scope of this project.

A1

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Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option A - Phase 1						
1	Roundabout	1	Horizontal deflection offers speed control Better serves functional classification of Gower Point Road Better serves major traffic flow between Gower Point and South Fletcher Reduced stops - reduced emissions	Requires significant ROW - this appears achievable at this location	150,000	80,000	400,000
2	Curb Extension	6	Provide localized road narrowing where drivers tend to slow down Provides mid-block and shorter crossing distance for pedestrians Allows for better designation of parking	Locations need to avoid driveways and may result in irregular spacing of measures	30,000	18,000	60,000
3	Reconfigure intersection	1	Tightens intersection turn radii - slowing turning speeds Eliminate corner cutting Shortens pedestrian crossing distances and improves visibility of and for pedestrians	Introduction of a stop for WB RT traffic - increased emissions	50,000	20,000	100,000
		Total			**230,000**	**118,000**	**560,000**

B U N T & ASSOCIATES

South Fletcher Road (West)

Town of Gibsons Traffic Calming

Exhibit **1**

A4

A5

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
4	Curb Extension	6	Provide localized road narrowing where drivers tend to slow down Provides mid-block and shorter crossing distance for pedestrians Allows for better designation of parking	Locations need to avoid driveways and may result in irregular spacing of measures	30,000	18,000	60,000
	Marked Crosswalk	3	Provide designated mid-block crossing points for pedestrians that match up with entrances to existing community land uses Heighten awareness of pedestrian crossing activity on South Fletcher	Some loss of on-street parking	600	300	900
5	Curb Pinch (per Pinch)	2	Tightens intersection entrance and turn radii with the intention of slowing travel speeds entering South Fletcher Road Shorten pedestrian crossing distances across South Fletcher		10,000	6,000	20,000
		Total			**40,600**	**24,300**	**80,900**
	Option A - Phase 2						
	Road Narrowing/ Sidewalk Construction						
6	Curb and Gutter	250m	Two through lanes and a parking lane - remainder of roadway width to be used to construct sidewalk		18,750	12,500	25,000
	Pavement Rehabilitation	250m			20,000	17,500	25,000
7	Sidewalk Construction	250m	Improve pedestrian accessibility and safety through separation from vehicle traffic		75,000	25,000	125,000
		Total			**113,750**	**55,000**	**175,000**

* Can be staged with temporary rubber curbing initially with permanent curbing later

A2

A3

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option A - Full Access						
1	Sidewalk Construction	50m	Formalize pedestrian link to Gibsons Way via a continuation of the eastern laneway opposite Corlett Provide pedestrians with an alternative route to Town Centre rather than the southern section of North Fletcher		15,000	5,000	25,000
2	Speed Hump (Local Street)	3	Provide only if speed continues to be an issue Space approximately 70-100m apart and place only north of Corlett Road	Increased noise for adjacent residents Could result in traffic diversion to Martin or Wyngaert Studies shown to increase air pollution No curb to anchor	6,000	3,000	15,000
3	Landscaping - Similar to Franklin Road	300m	Reduces pavement width and perceived width Formalizes on-street parking Aesthetics	Reduces plentiful supply of parking to dedicated parking pockets	84,000	75,000	90,000
4	Trim Vegetation	1	Improve intersection sight distance on the SE corner of the intersection	Vegetation may be located on private property	750	500	1,000
		Total			**105,750**	**83,500**	**131,000**

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North Fletcher Road - Option A

Town of Gibsons Traffic Calming

Exhibit **3A**

B4

B5

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option B - One Way Uphill						
1	Signage	4	Will eliminate SB cut-through traffic Removes SB speed issue on steep grade Removes sight distance issue on SB approach Reduces impact of staggered intersection arrangement with South Fletcher Removes interlocking SB LT with NB LT from South Fletcher	Altered traffic arrangement for local residents - e.g. residents can no longer travel SB to get to Town Centre, however have more choices than a full road closure Some diversion of SB cut-through traffic to the Gibsons Way/School Road intersection	600	400	800
2	Narrow Roadway	150m	Provide width for the formation of a pedestrian path or trail		6,000	4,500	7,500
3	Sidewalk Construction	150m	Separate pedestrians from vehicle traffic		45,000	15,000	75,000
4	Intersection Channelization	1	Physically hinder/discourage EB RT from Corlett		5,000	3,000	10,000
5	Speed Hump (Local Street)	3	Provide only if speed continues to be an issue Space approximately 70-100m apart and place only north of Corlett Road	Increased noise for adjacent residents Could result in traffic diversion to Martin or Wyngaert Studies shown to increase air pollution No curb to anchor	6,000	3,000	15,000
6	Trim Vegetation	1	Improve intersection sight distance on the SE corner of the intersection	Vegetation may be located on private property	750	500	1,000
		Total			**63,350**	**26,400**	**109,300**

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North Fletcher Road - Option B

Town of Gibsons Traffic Calming

Exhibit **3B**

C1

C2

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option C - Road Closure						
1	Full Closure	1	Depending on location of closure - removes cut-through traffic issue and may reduce perception of traffic speed given resident only traffic Improved pedestrian access to School Road Removes SB speed issue down steep grade Removes sight distance issue at School Rd intersection Removes interlocking SB LT with NB LT from South Fletcher	If closure is located north of Corlett, could result in cut-through traffic diverting to Martin or Wyngaert Restricted resident access to Town Centre, traffic diverted to Gibsons Way intersection	30,000	10,000	120,000
2	Speed Hump (Local Street)	3	Provide only if speed continues to be an issue Space approximately 70-100m apart and place only north of Corlett Road	Increased noise for adjacent residents Could result in traffic diversion to Martin or Wyngaert Studies shown to increase air pollution No curb to anchor	6,000	3,000	15,000
3	Landscaping - Similar to Franklin Road	300m	Reduces pavement width and perceived width Formalizes on-street parking Aesthetics	Reduces plentiful supply of parking to dedicated parking pockets	84,000	75,000	90,000
4	Trim Vegetation	1	Improve intersection sight distance on the SE corner of the intersection	Vegetation may be located on private property	750	500	1,000
		Total			**120,750**	**88,500**	**226,000**

BUNT & ASSOCIATES

North Fletcher Road - Option C

Town of Gibsons Traffic Calming

Exhibit **3C**

A2

A3

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option A - Phase 1						
1	Reconfigure intersection	1	Better defines Glassford Road as a local street rather than a collector route	Does not address intersection proximity to Franklin Drive	50,000	20,000	100,000
2	Curb Radius Reduction	1	Tightens NB right-turn radius - slowing travel speeds entering Glassford Road Eliminate corner cutting	May result in difference in speed between NB right-turn and NB through vehicles (increased risk of rear-end crashes)	5,000	3,000	10,000
3	Speed Hump (Local Street)	5	Speed control through spacing at approximately 100m	No curb to anchor speed humps Does not address the width of Gower Point Road Increased noise (acceleration and deceleration between control measures) and emissions	10,000	5,000	25,000
4	Reconfigure intersection	1	Better defines the priority of Gower Point Road rather than Glassford Road Improved definition of stop-control on Glassford Road Reduced turning radii and speeds from Glassford onto Gower Point Road		50,000	20,000	100,000
		Total			**115,000**	**48,000**	**235,000**
	Option A - Phase 2						
5	Landscaping - Similar to Franklin Road	600m	Reduces pavement width and perceived width Formalizes on-street parking Aesthetics	Reduces plentiful supply of parking to dedicated parking pockets Must ensure that adequate on-street parking at the Church Hall is maintained under any scheme	168,000	150,000	180,000
6	Relocate intersection	1	Increases intersection separation between Glassford and Franklin	Not necessarily a "traffic calming" recommendation Significant cost for the benefit	75,000	50,000	200,000
		Total			**243,000**	**200,000**	**380,000**

B U N T & ASSOCIATES

Glassford Road - Option A

Town of Gibsons Traffic Calming

Exhibit **4A**

B1

B3

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option B - Phase 1						
1	Full Closure (at south end)	1	Could be tested as a temporary measure Eliminates cut-through traffic (which may also remove resident perception of speed) Solves intersection spacing issue along Gower Point Opportunity for greenspace at location of closure	Altered access for residents, in particular residents at the south end of Glassford who may use Gower Point Road will now need to use Glassford May alter/impact emergency access routes	30,000	10,000	120,000
2	Reconfigure intersection	1	Better defines the priority of Gower Point Road rather than Glassford Road Improved definition of stop-control on Glassford Road Reduced turning speeds from Glassford onto Gower Point Road		50,000	20,000	100,000
		Total			**80,000**	**30,000**	**220,000**
	Option B - Phase 2						
3	Speed Hump (Local Street)	5	Need only be implemented if speed is still an issue following road closure Speed control through spacing at approximately 100m	No curb to anchor speed humps Does not address the width of Gower Point Road Increased noise (acceleration and deceleration between control measures)	10,000	5,000	25,000
		Total			**10,000**	**5,000**	**25,000**

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Glassford Road - Option B

Town of Gibsons Traffic Calming

Exhibit **4B**


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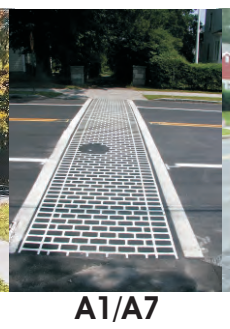
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A4


A5

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option A						
1	Curb Pinch (per Pinch)	2	Tightens intersection entrance and turn radii with the intention of slowing travel speeds entering O'Shea Road Reduce corner cutting Shorten pedestrian crossing distances across O'Shea		10,000	6,000	20,000
	Textured Crosswalk	30m2	Better define O'Shea as a collector street and designate to drivers that they are entering a traffic calmed area		3,000	1,500	4,500
	Traffic Calmed Neighbourhood Sign	1	Inform drivers that they are entering a traffic calmed area		150	100	200
2	Remark road centreline	465m	Existing cross-section is too wide for 2 travel lanes but too narrow for parking on both sides New cross-section will provide for a parking lane on one side with narrower travel lanes	Loss of on-street parking on one side of street	2,325	465	4,650
	On-Street Parking	465m	Designate parking on one side of street Additional road markings may impact driver behaviour to slow down	Loss of on-street parking on one side of street	2,325	465	4,650
3	Curb Extension	2	Provide localized road narrowing where drivers tend to slow down Provides mid-block and shorter crossing distance for pedestrians Allows for better designation of parking	Locations need to avoid driveways and may result in irregular spacing of measures	10,000	6,000	20,000
4	Traffic Circle	2	Reduced vehicle speeds Aesthetics Bi-directional treatment		30,000	10,000	60,000
5	Raised Crosswalk	1	Vehicle speed reduction Pedestrians are more visible Emphasize importance of trail and school crossings	Increased noise for adjacent residents Studies shown to increase air pollution	7,000	2,000	10,000
6	Curb and Gutter	135m	Part of road improvement project		10,125	6,750	13,500
	Pavement Rehabilitation	270m	Part of road improvement project		21,600	18,900	27,000
	Sidewalk Construction	135m	Part of road improvement project		40,500	13,500	67,500
	Landscaping - Similar to Franklin Road	135m	Part of road improvement project		37,800	33,750	40,500
7	Curb Pinch (per Pinch)	2	Tightens intersection entrance and turn radii with the intention of slowing travel speeds entering O'Shea Road Reduce corner cutting Shorten pedestrian crossing distances across O'Shea		10,000	6,000	20,000
	Textured Crosswalk	30m2	Better define O'Shea as a collector street and designate to drivers that they are entering a traffic calmed area		3,000	1,500	4,500
	Traffic Calmed Neighbourhood Sign	1	Better define O'Shea as a collector street and designate to drivers that they are entering a traffic calmed area		150	100	200
		Total			**187,975**	**107,030**	**297,200**

B U N T & ASSOCIATES

O'Shea Road - Option A

Town of Gibsons Traffic Calming

Exhibit **5A**


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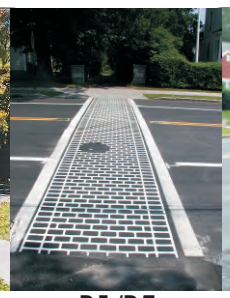
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B1


B5

Item (#)	Improvement	Quantity	Advantages	Disadvantages	Estimated Cost ($)	Low End of Range ($)	High End of Range ($)
	Option B						
1	Curb Pinch (per Pinch)	2	Tightens intersection entrance and turn radii with the intention of slowing travel speeds entering O'Shea Road Reduce corner cutting Shorten pedestrian crossing distances across O'Shea		10,000	6,000	20,000
	Textured Crosswalk	30m2	Better define O'Shea as a collector street and designate to drivers that they are entering a traffic calmed area		3,000	1,500	4,500
	Traffic Calmed Neighbourhood Sign	1	Inform drivers that they are entering a traffic calmed area		150	100	200
2	Remark road centreline	465m	Existing cross-section is too wide for 2 travel lanes but too narrow for parking on both sides New cross-section will provide for a parking lane on one side	Loss of on-street parking on one side of street	2,325	465	4,650
	Chicane	1	Create painted chicane by alternating parking between sides of the road Reduced vehicle speeds	Painted chicane alone may be ignored by drivers	20,000	10,000	100,000
	On-Street Parking	465m	Designate parking on one side of street Additional road markings may impact driver behaviour to slow down	Loss of on-street parking on one side of street	2,325	465	4,650
3	Curb Extension	7	Provide localized road narrowing where drivers tend to slow down Provides mid-block and shorter crossing distance for pedestrians Allows for better designation of parking	Locations need to avoid driveways and may result in irregular spacing of measures	35,000	21,000	70,000
4	Curb and Gutter	135m	Part of road improvement project		10,125	6,750	13,500
	Pavement Rehabilitation	270m			21,600	18,900	27,000
	Sidewalk Construction	135m			40,500	13,500	67,500
	Landscaping - Similar to Franklin Road	135m			37,800	33,750	40,500
5	Curb Pinch (per Pinch)	2	Tightens intersection entrance and turn radii with the intention of slowing travel speeds entering O'Shea Road Reduce corner cutting Shorten pedestrian crossing distances across O'Shea		10,000	6,000	20,000
	Textured Crosswalk	30m2	Better define O'Shea as a collector street and designate to drivers that they are entering a traffic calmed area		3,000	1,500	4,500
	Traffic Calmed Neighbourhood Sign	1	Better define O'Shea as a collector street and designate to drivers that they are entering a traffic calmed area		150	100	200
		Total			**195,975**	**120,030**	**377,200**

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O'Shea Road - Option B

Town of Gibsons Traffic Calming

Exhibit **5B**

1. South Fletcher Road between Gower Point Road and School Road

Issues	Speed, pedestrian safety, traffic control at Gower Point Road and Winn Road
Observed Traffic Volumes	65 vehicles (15-minute volume between 8:45 – 9:00 a.m. on Wednesday 31st October, 2007), west of School Road
On-street Parking	22 – 30 vehicles between 9:00 a.m. and 12:00 p.m.
Observed Traffic Speeds	Vehicles in both directions exceed the 30km/h posted speed in the eastern section (Winn Road to School Road), vehicles appear to often exceed the 50km/h posted speed in the western section (Gower Point Road to Winn Road).
Suggested Mitigations	Two sections: A. between Gower Point Road and Winn Road, and B. between Winn Road and School Road. Section A: reconstruct the Gower Point Road/South Fletcher Road intersection as a single lane roundabout. This is a traffic control measure that will deliver the appropriate continuity for the arterial route of Gower Point Road, whilst allowing appropriate traffic control for the major traffic flow between Gower Point Road and South Fletcher Road. The deflection offered by an appropriately designed roundabout will also offer a speed control mechanism. Mid-block speed control can be trialed with localized road narrowings through curb extensions. These can also serve as unofficial mid-block crossing points for pedestrians. The South Fletcher Road/Winn Road intersections should be tightened through use of curb pinching to reduce pedestrian crossing distances and reduce existing turning radii. This includes removing the westbound right turn lane. Section B: Provide curb extensions along with marked pedestrian crosswalks at three priority locations – in front of the Library entrance, in front of the entrance to the Town Hall, and at the entrance to the school district offices. This will result in the loss of approximately 4-5 parking stalls but will significantly improve pedestrian safety. There are parking opportunities not currently utilized that could overcome the parking loss including parking at the community health unit parking lot. Entry treatments could be provided at the intersection with School Road through curb pinching. This will also tighten turning radii from School Road and reduce entering speeds. A significant road improvement project is also required between the Community Health driveway and School Road to reduce the pavement width on the eastern side and construct a sidewalk.

2. North Fletcher Road between School Road and Gibsons Way

Issues	Cut-through traffic (particularly southbound), speed (particularly downhill), pedestrian safety, narrow single-lane portion of roadway
Observed Traffic Volumes	16 vehicles (15-minute volume between 8:28 – 8:43 a.m. on Wednesday 31st October, 2007), north of Corlett Road
Observed Traffic Speeds	Vehicles exceed 30km/h posted speed in single-lane section, particularly downhill. Some vehicles observed traveling above posted speed in two-lane section.
Suggested Mitigations	One option is to make North Fletcher Road one-way uphill between School Road and Corlett Road. This will reduce speeds and cut-through traffic, which are predominately southbound issues. This will also improve safety at the School Road intersection by reducing the interaction with vehicles turning left out of South Fletcher. If speed remains a problem north of Corlett Road, speed humps or roadside landscaping (similar to that on Franklin Road) may be considered. Alternatively, North Fletcher could be closed at School Road. This will result in a considerable change in accessibility for local residents but eliminates cut-through traffic, speed concerns on the steep section between School Road and Corlett Road, and provides a safe pedestrian connection to School Road.
Other Comments	It is recommended that the functional classification of North Fletcher be changed from a collector street to a local street.

3. Glassford Road from Gower Point Road (south) to Gower Point Road (north)

Issues	Short-cutting traffic, speed, cutting corners and limited visibility at the southern intersection with Gower Point Road
Observed Traffic Volumes	18 vehicles (15-minute volume between 9:05 – 9:20 a.m. on Wednesday 31st October, 2007), south of Gower Point Road
Observed Traffic Speeds	Some vehicles exceed 50km/h posted speed.
Suggested Mitigations	Reconfiguration of the southern intersection with Gower Point Road to tighten turn radii and eliminate corner cutting. Longer term measure may be to relocate the intersection further north to further improve intersection sight distance. Sight distance would be aided by trimming of the vegetation on the south-east corner of Gower Point Road/Franklin Road.
Suggested Mitigations	Speed control measures for Glassford could adopt speed humps given the route is not a transit route. Alternatively, or in conjunction with this measure, landscaping similar to that on Franklin Road could be implemented along the length of the street. All plans must ensure adequate on-street parking is retained at the church hall at the northern end of the street. Alternative solution is to close Glassford Road at the southern end thereby eliminating cut-through traffic. This may also remove the issue of speed.
Other Comments	Closure of the southern end of Glassford Road would also remove the sight distance and spacing issues associated with Gower Point Road and Franklin Road. This solution could be initiated on a trial basis at relatively little cost.

4. O'Shea Road from Shaw Road to School Road

Issues	Short-cutting traffic, speed.
Observed Traffic Volumes	10 vehicles and 27 vehicles (15-minute volumes between 8:10 – 8:25 a.m. and 1:30 – 1:45 p.m. on Wednesday 31st October, 2007 respectively), west of School Road.
Observed Traffic Speeds	Some vehicles traveling over the posted speed.
Suggested Mitigations	Entry treatments to slow entry speeds, remarking of the centre line to narrow the effective lane width, mark parking on one side of the street, curb pinching at select locations to achieve "chokers", curb extensions at marked crosswalks, painted chicane created by alternating parking from one side of the street to the other, low-profile raised crosswalks. Road reconstruction project is required at the eastern end to complete the sidewalk network, reduce pavement width and repair cracked pavement. This work is in need of being completed and would have the added benefit of providing some traffic calming.
Other Comments	This street is currently serving its role as a collector street and is therefore going to experience higher traffic volumes than a local road, however short-cutting was observed in the eastbound direction (likely drivers trying to avoid the two signals on Gibsons Way to access the Town Centre).

5. Headlands Road from Burns Road to Dougall Road

Traffic speed was identified by residents as the primary issue on Headlands Road. At the time of this report, the pavement between Franklin Road and Bay Road was being resurfaced, and a traffic circle and rain garden being constructed at the Headlands Road/Dougall Road intersection. It is also understood that improvements are being proposed at the Headlands Road/Burns Road/Franklin Road intersection for 2008 including the closure of the short section of Burns Road between Harmony Road and Franklin Road.

It is recommended, therefore, that these road network changes be monitored to determine if they have addressed the issue of traffic speed. This site can be added to the master site list under future iterations as necessary.

3.5 Sites Not Appropriate for Traffic Calming

As mentioned previously, there were a number of sites identified by residents at the Open House with traffic issues that can not be corrected through application of traffic calming measures in isolation, or at all. These sites are on Arterial roadways or Provincial Highways (where the vast majority of traffic calming measures would be highly inappropriate due to the volume and mix of traffic/function of the roadway), and should be addressed more thoroughly through commission of detailed planning, traffic safety and design studies.

The top three “non-traffic calming” sites as identified by residents are highlighted and discussed below:

- *Gower Point Road/Marine Drive/School Road intersection:* this is highest priority concern of local residents who provided feedback at the open house, including a petition with 153 signatures. The primary issues at the site are confusion regarding the existing 3-way stop traffic control, the steep grade of School Road contributing to high vehicle speeds and reduced traffic safety, and general pedestrian safety. This location and the nearby Marine Drive/School Road/Molly’s Lane intersection need to

be the focus of a specific traffic safety and engineering review that identifies the existing safety and operational issues, identifies appropriate traffic engineering and design solutions and conducts a detailed evaluation.

- *School Road:* vehicle speeds downhill (in the south-eastbound direction) are a concern to local residents as well as vehicle and pedestrian safety at intersecting roadways. School Road should be the focus of a corridor traffic and pedestrian safety study that considers a broad range of solutions, including restriction of downhill movements, which would result in a redistribution of traffic onto Gibsons Way.
- *Upper Gibsons Way:* issues related to traffic operations and safety at signalized and unsignalized intersections. It is anticipated that the Ministry of Transportation will be completing a safety upgrade to Highway 101 between School Road and Payne Road as early as 2008.

3.6 Roadway Functional Classifications

Based on Bunt's site observations and comments received from the public consultation process, it is the opinion of the project team that the Town's road network functional classification needs to be reviewed to reflect both the intended and actual function of roadways throughout the Town. In particular, there are several roadways which are classified as "collectors" which should be downgraded to "local" roads:

- North Fletcher Road (too steep and narrow for collector; alternative available)
- Glassford Road (too short, no network continuity)
- Abbs Road (no network continuity)
- Hillcrest Road (too short, no network connectivity)

The above classification changes are based on observations of current conditions; any road reclassification may best be achieved in conjunction with a general Official Community Plan (OCP) review and/or the preparation of a Transportation Master Plan update.

3.7 Priority for Traffic Calming

The five top traffic calming sites have been prioritized in **Table 2** according to the criteria established in the Traffic Calming Policy recommended to the Town of Gibsons by Bunt & Associates (as detailed in the following report section).

Table 2: Prioritization of Potential Traffic Calming Sites

Location	Criteria (Weighting)				Points Total	Ranking
	Approval Date (10)	Support (8)	Volume (6)	Speed (6)		
South Fletcher	10	10	10	9	294	1
O'Shea	10	3	4	5	182	2
North Fletcher	10	3	2	7	178	3
Glassford	10	1	3	4	146	4
Headland	10	5	0	0	137	5

Based on Table 2, the order of priority for traffic calming implementation is:

- South Fletcher Road;
- O'Shea Road;
- North Fletcher Road;
- Glassford Road; and
- Headlands Road (as appropriate).

4.0 TRAFFIC CALMING POLICY

4.1 Open House Questionnaire Results

A questionnaire was issued to attendees of the open house meeting and posted on the Town of Gibsons website, which was intended to gather information regarding residents' preferences related to traffic calming policies. Questionnaires were issued one per household and a total of 23 responses were received. The results are summarized in **Appendix D** and discussed below.

In terms of the preferred evaluation procedure, residents showed strong support for traffic calming sites to be identified by Council or based on resident request/petition. There was much lower support for the implementation of a traffic calming warrant based on objective criteria such as speed or volume to identify sites for evaluation.

Overwhelmingly, residents supported the evaluation of traffic calming projects in the order that they are received. There was also strong support for considering the number of households requesting traffic calming on their street (assumed to be as a proportion of the total number of households on the street). Quantitative measures such as speed and traffic volume were not rated highly for prioritizing sites. Nevertheless, residents were asked to rate different evaluation criteria, which were subsequently ranked from highest to lowest priority as follows:

1. Resident support;
2. Cut-through traffic;
3. Traffic volume;
4. Traffic speed;
5. Crash history;
6. Prior attempts at enforcement or education;
7. Noise;
8. Land use (e.g. schools or playgrounds);
9. Others: aesthetics, restoration of Village ambiance, cyclist priorities.

In terms of implementation, survey respondents replied strongly that fronting residents and those residents on adjacent streets that may be impacted by diverted traffic should vote on proposed traffic calming solutions. Although the wider community received a majority of support to be included in the voting process, the response was much less affirmative than for fronting or adjacent residents.

All but one respondent to the question regarding the level of support required for approval of a traffic calming plan requested greater than 50% approval be sought. One suggestion (supported by other literature as noted below) was to require 70% approval on the fronting street and 50% approval amongst the wider community.

The preferred funding option was that the Town develop a number of traffic calming options, which are voted on by residents. The Town then funds the basic option and residents are given the option to fund the "upgrades". Reasonably strong support was also given to the Town funding the preferred option regardless of cost. However, the Town funding only the basic option with no opportunity for resident funding realized the least amount of support. Seventy-five percent of respondents believed that resident funded traffic calming opportunities should be made available. This has been addressed in the recommended traffic calming policy detailed below.

4.2 Literature Review

A literature review of traffic calming policies adopted by other municipalities in southwestern British Columbia, other parts of Canada, and a number of locations in the United States was undertaken and is summarized at **Appendix E**.

The types of traffic calming policies available or in practice are almost as numerous as the agencies reviewed; some have only small variations, while others are atypical. A recommended traffic calming policy has been developed for the Town of Gibsons based on the findings of this review.

4.3 Staff Feedback

The Project Team developed a draft traffic calming policy outline which was forwarded to Town of Gibsons' staff for review as it was important that the policy be straightforward, practical, implementable and not result in undue staff resources to follow.

Feedback from staff focused on:

- Creating an efficient process for staff;
- Separating traffic calming from traffic engineering or traffic safety projects;
- Providing an avenue for Council and/or Committee input into the process;
- Coordination of traffic calming priorities with the schedule of annual programs and upcoming development projects.

4.4 Recommended Traffic Calming Policy

The recommended traffic calming policy incorporates aspects of similar policies from other municipalities in Canada and the United States, as summarized in the previous report sections, and has been developed based on feedback received through the public consultation process and from Town staff.

The proposed methodology that would constitute the Town of Gibsons Traffic Calming Policy is illustrated on **Exhibit 6** and described in the steps below.

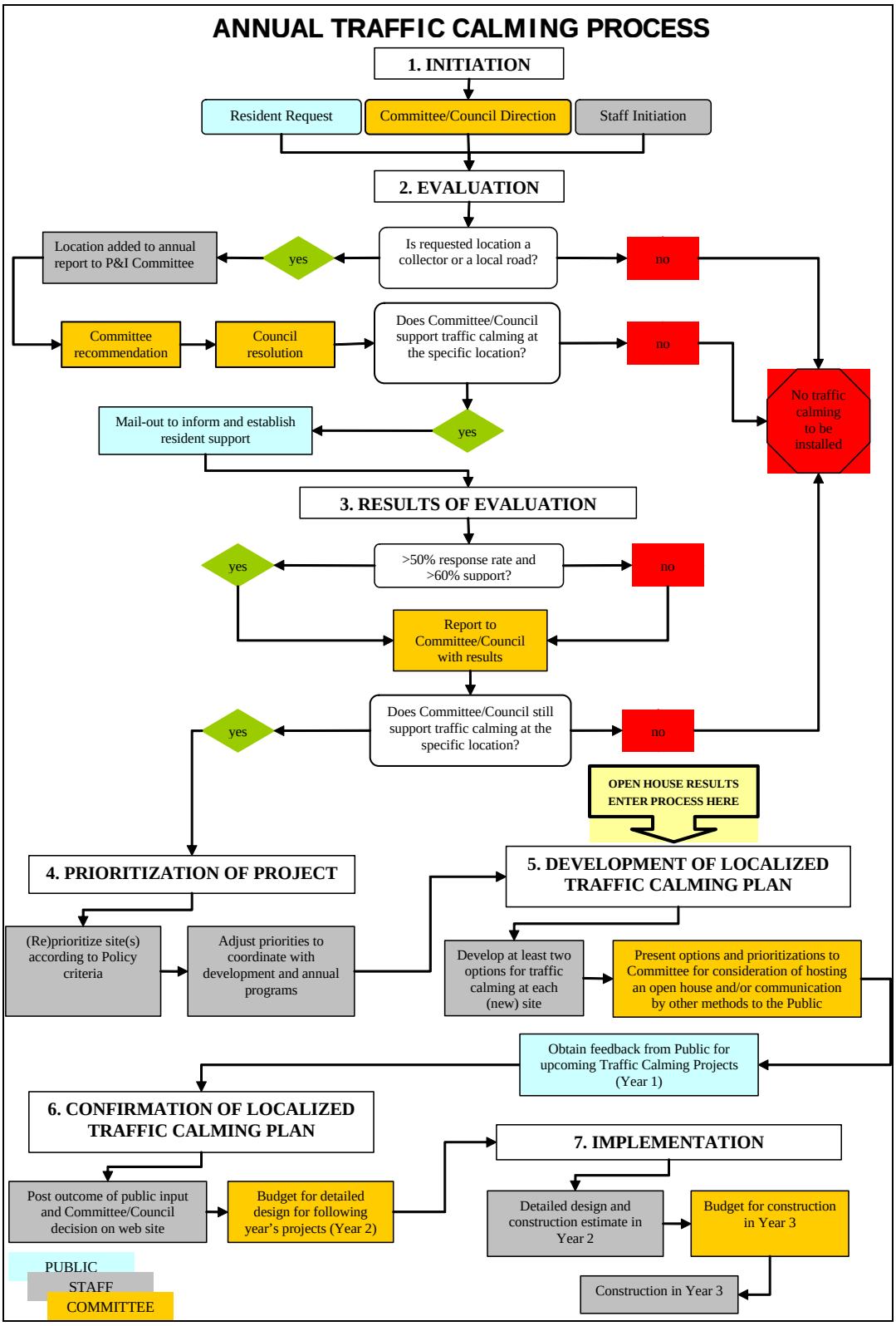

Exhibit 6: Town of Gibsons Recommended Traffic Calming Policy Methodology

1. Initiation of Traffic Calming Review

There are three criteria that would trigger a traffic calming review:

A. Resident Request

This requires a petition signed by at least 50% of all households fronting blocks where traffic calming is desired. A draft petition form that could be posted on the Town's website is included in **Appendix F**.

B. Staff Initiation

This could be triggered by calls/letters from individual residents which are logged by staff, through staff knowledge and observation, or (if deemed appropriate in the future) through a traffic volume/speed monitoring program.

C. Council Direction

2. Traffic Calming Evaluation

Locations initiating a traffic calming review would be compiled by staff and sites meeting the functional classification requirements, i.e. local and collector streets only, would be brought to the Parks and Infrastructure Committee once a year for direction. Upon approval, staff would undertake an evaluation of the need for traffic calming consisting of the following test:

Criteria	Evaluation
Resident Support – measured from a mailout survey of all fronting households. Staff has full discretion as to which households receive the survey. A draft mailout letter is included in **Appendix G**.	>50% response rate, and >60% of respondents are in support of considering the installation of traffic calming on their street.

3. Results of Evaluation

Following the evaluation, and subsequent report to the Parks and Infrastructure Committee, staff would notify all households advising of the results of the evaluation and the direction from Committee and Council. This notification can be via the Town of Gibsons website to minimize staff effort, and/or by telephone or letter if deemed appropriate. If the response is positive, the information on the website/in the letter will describe the next steps and the prioritization process.

4. Prioritization of Project

Once a preferred scheme is selected, it would be put on the Traffic Calming Project Master List. The Master List will contain projects to be prioritized as follows, in the order of the most to least important criteria:

- Date of Parks & Infrastructure Committee approval to proceed in traffic calming review (10 weighting points). Note that this is somewhat different than the "order in which requests are received" but gives staff and/or the Committee some discretion and also establishes a clear, undisputable date which is officially minuted;
- Percentage of fronting households supporting traffic calming (8 weighting points) measured from Test 2 of the "Traffic Calming Evaluation";
- Volume of traffic (6 weighting points): this could be estimated or measured a number of different ways, varying in complexity and cost, including staff judgement, spot peak hour counts, or automatic counts. This allows the methodology to evolve as the Town increases its resources over time.
- Speed of traffic (6 weighting points): this could be measured a number of different ways varying in complexity and cost including staff judgement, spot counts (time to travel between two set points measured by a stop watch), or automatic counts.

Each of the four criteria is given a rating normalized to between 1 and 10, with 10 indicating highest priority and 1 indicating lowest priority based on its comparative rating to other projects on the Master List (rather than an absolute rating related to fixed "warrant" levels). This approach allows some element of staff judgement as well as varying degrees of effort in data collection. The ratings are then multiplied by the weighting points and those with the highest sums would be recommended for implementation, subject to annual funding allocated to traffic calming projects by Council.

Once a year, staff should revisit the ratings of all traffic calming projects (old and new) on the master list. The final project selection in each budget year would be subject to coordination with both the schedule of annual programs, e.g. the

annual road and water rehabilitation programs, and upcoming development opportunities so as to make the most of opportunities to integrate traffic calming projects with other planned works. This would be entirely at the discretion of staff and Council.

5. Development of Localized Traffic Calming Plans

Following the preparation of an overall, prioritized Traffic Calming Master List, staff should facilitate the preparation (either in-house or through consultation) of at least two localized traffic calming plan options for each location: one "basic", least cost option, and at least one alternative.

If appropriate, Committee and staff would host an open house meeting to present the options. A questionnaire form would be provided to get feedback on the options presented, which includes a deadline. A draft questionnaire form is included in **Appendix H**. Staff can then refine the plans based on this feedback.

Preliminary cost estimates would then be prepared for each of the options. The majority of public input from the October 2007 open house meeting supported Council to fund the basic option, with the opportunity for residents to fund the difference for the alternative option. However, the mechanism for funding traffic calming would be left entirely to the discretion of Council.

6. Confirmation of Preferred Traffic Calming Plan

The outcomes of the open house and Committee/Council decisions will be posted on the Town of Gibsons website and a budget item allocated in Council's following year budget for detailed design.

7. Implementation of Project

Staff should prepare a yearly report to Council on recommended traffic calming projects for implementation as part of regular budget cycle. Council would then select traffic calming projects for implementation. Depending on the time between the confirmation of the preferred traffic calming plan and Council's approval for implementation, a follow-up survey may be required to re-confirm

preferred option (e.g. if more than three years has elapsed, residents probably should be surveyed again).

Detailed design and cost estimates would then be prepared for the projects to be implemented. It may be prudent in most cases to assign budget for the design of a project one year and construction the next as appropriate.

Fronting residents will also be re-surveyed if they will be funding all or part of the project; otherwise a letter to residents advising of the construction of the project will be mailed out.

5.0 RECOMMENDATIONS

It is recommended that:

- The Parks & Infrastructure Committee endorse the recommended traffic calming policy and forward it to Council for approval;

- If approval is received, that staff prepare and maintain a Traffic Calming Master List, which has the seven locations identified in Table 1 and has the top priorities for implementation as:
    - South Fletcher Road;
    - O'Shea Road;
    - North Fletcher Road;
    - Glassford Road; and
    - Headlands Road (as appropriate).

- Depending on resources available in this year's budget, staff could "fast track" the planning and design process for the highest priority locations, by:
    - Obtaining Council approval to proceed with one or more projects;
    - Developing conceptual/functional plans of traffic calming options;
    - Working with the Parks and Infrastructure Committee and the public to identify the preferred option; and
    - Preparing detailed designs and cost estimates.

- Staff should address the highest priority sites where traffic calming is not considered appropriate, by establishing Terms of Reference and conducting/commissioning planning and conceptual design studies for the following:
    - Gower Point Road/Marine Drive/School Road and Marine Drive/Molly's Lane intersections;
    - School Road; and

  - Upper Gibsons Way intersections (understood to be subject to a safety upgrade between School Road and Payne Road as early as 2008).

- The Town of Gibsons, during its next Transportation Master Plan update, should consider changing the following roadways from “collector” to “local” roads:
  - North Fletcher Road;
  - Glassford Road;
  - Abbs Road; and
  - Hillcrest Road.

Appendix A

Traffic Calming Measures

Traffic Calming Measures

Classifications

- *Vertical Deflection*
- *Horizontal Deflection*
- *Obstruction*
  - *Passive*
  - *External*

BUNT & ASSOCIATES

Vertical Deflection Measures

Description

Traffic calming measures which cause a vertical deflection of motor vehicles. This deflection generally reduces vehicle speeds, because motorists slow to avoid unpleasant sensations when traversing the traffic calming measure. Reducing the speed can also have the secondary effects of reducing traffic volumes, reducing conflicts, and enhancing the neighbourhood environment.

Types Include:

- Speed Hump
- Speed Table / Raised Crosswalk
- Speed Cushions
- Raised Intersection
- Sidewalk Extension
- Textured Crosswalk
- Rumble Strip
- Textured Pavement

Source: Canadian Guide to Neighbourhood Traffic Calming

BUNT & ASSOCIATES

Speed Hump

Vertical Deflection Measure

Source: Bunt & Associates Photo Database

Benefits

- *Effective speed reduction*
- *Short-cut traffic reduction*
- *Relatively inexpensive*

Disadvantages

- *Delays & damage to emergency and transit vehicles*
- *Parallel traffic diversion*
- *Increased noise & air pollution*

Applicability

Road Classification:

- *Local and minor collector streets*

Traffic Condition

- *Posted speed limit ≤ 50km/h*
- *All traffic volumes*

Locations to Avoid

- *Designated emergency access and transit routes*
- *Limited sight distance locations (eg. small-radius horizontal curves)*
- *Driveways and accesses to underground utilities*
- *≤ 25m from bus stop, ≤ 75m from traffic signal, ≤ 15m from local street intersection (≤ 30m from collector street intersection)*
- *Grades > 8%*

BUNT & ASSOCIATES

Speed Table/Raised Crosswalk

Vertical Deflection Measure

Source: http://www.saferoutesinfo.org/guide/engineering/images/speed_table.jpg

Benefits

- *Pedestrians are more visible*
- *Vehicle speed reduction (less than speed humps)*
- *Can be aesthetic (added expense)*

Disadvantages

- *As per Speed Hump*
- *Cyclist discomfort*
- *Increased maintenance requirements (eg. providing drainage)*

Applicability

Road Classification:

- *Local and minor collector streets*

Traffic Conditions

- *Posted speed limit ≤ 50km/h*
- *All traffic volumes*

Locations to Avoid

- *Designated emergency access and transit routes*

BUNT & ASSOCIATES

Speed Cushions

Vertical Deflection Measure

Source:http://www.trafficlogix.com/speed-cushions.asp

Applicability

Road Classification:

- *Local and minor collector streets*

Traffic Conditions

- *Posted speed limit ≤ 50km/h*
- *All traffic volumes*

Benefits

- *Slow vehicles*
- *Traversable by emergency, service, and transit vehicles*
- *Cycle-friendly*
- *Cost effective*

Disadvantages

- *Anecdotally not as effective as speed humps in slowing vehicles*
- *Increased noise*
- *Increased maintenance requirements (eg. snow removal, street cleaning)*

BUNT & ASSOCIATES

Raised Intersection

Vertical Deflection Measure

Source: http://linden.mrrpc.org/images/raisedint3.jpg

Applicability

Road Classification:

- *Local and collector streets*

Traffic Conditions

- *Posted speed limit ≤ 50km/h*
- *All traffic volumes*
- *Few large vehicle turns*

Locations to Avoid

- *Designated emergency access routes*

Benefits

- *Vehicle speed reduction*
- *Better defined pedestrian area – improved ped safety*
- *Bi-directional traffic calming*
- *Aesthetics*

Disadvantages

- *Less effective speed reduction than other vertical deflection measures*
- *High cost (c.f. speed humps)*
- *Delays to emergency and transit vehicles*
- *Maintenance (drainage, snow removal)*

BUNT & ASSOCIATES

Sidewalk Extension

Vertical Deflection Measure

Source: Canadian Guide to Neighbourhood Traffic Calming

Applicability

Road Classification:

- *Local street intersection with collector or arterial streets*

Traffic Condition

- *Stop control*
- *All traffic volumes*

Benefits

- *Pedestrian priority is reinforced*
- *Relatively low cost*

Disadvantages

- *Pedestrian false sense of security – continuation of walkway through intersection*

BUNT & ASSOCIATES

Textured Crosswalk

Vertical Deflection Measure

Source: http://www.roundaboutsusa.com/images/provo12Large.jpg

Applicability

Road Classification:

- *Local and collector streets*

Traffic Condition

- *All traffic volumes*
- *High pedestrian volumes*

Benefits

- *Increased awareness of pedestrian crosswalk*
- *Contrast for pedestrians*
- *Aesthetic*
- *Signifies entry to an area*

Disadvantages

- *Increased noise (if poorly designed)*
- *Surface difficulties for bicycles, motorcycles, and wheelchairs*
- *Expensive*

BUNT & ASSOCIATES

Rumble Strip

Vertical Deflection Measure

Source: http://www.dot.ca.gov/hq/esc/ttsb/instrumentation/images/subtemplate/Strip%205b.jpg

Applicability

Road Classification:

- *Local and collector residential streets*

Traffic Condition

- *All traffic volumes*

Locations to Avoid

- *Do not use as a speed control device*

Benefits

- *Some effect on vehicle speeds*
- *Can improve awareness of traffic regulations where standard signage is ineffective*

Disadvantages

- *Increased traffic noise*
- *Increased maintenance requirements*
- *Can create problems for bicyclists and motorcyclists*
- *Easily avoided by motorists*

BUNT & ASSOCIATES

Textured Pavement

Vertical Deflection

Source:http://www.trafficcalming.org/texturedpavements.html

Applicability

Road Classification:

- *Main Street*

Traffic Condition

- *All traffic volumes*
- *High pedestrian volumes*

Benefits

- *Emphasize shared road space*
- *Reduced vehicle speeds*
- *Aesthetic*
- *Bi-directional traffic calming*

Disadvantages

- *Expensive*
- *Unfriendly to wheelchair and visually-impaired*
- *Increased noise*

BUNT & ASSOCIATES

Horizontal Deflection Measures

Description

Traffic calming measures which cause a horizontal deflection of motor vehicles. These measures discourage short-cutting or through traffic, however not to the extent of obstruction measures. Some measures also reduce vehicle speeds, reduce conflicts, or enhance the neighbourhood environment.

Types Include:

- Chicane
- Curb Extension
- Traffic Circle
- Roundabout
- Curb Radius Reduction
- On-street Parking
- Chokers
- Raised Median Island
- Centre Island Narrowing

Source: Canadian Guide to Neighbourhood Traffic Calming

B U N T & ASSOCIATES

Chicane

Horizontal Deflection Measure

Source: http://www.trafficcalming.org/chicanes.html

Applicability

Road Classification:

- *Local streets*
- *Collector streets(2-lane chicane only)*

Traffic Condition

- *Low traffic volumes (1-lane chicane)*
- *Posted speed ≤50km/h*

Locations to Avoid

- *Numerous driveways (increased cost)*
- *1-lane chicanes should not be used on transit or emergency access routes*

Benefits

- *Discourage high speeds*
- *Improved emergency vehicle operations*
- *Improved noise (c.f. vertical treatments)*
- *Enhanced appearance of street*
- *Cyclist permeability can be maintained*

Disadvantages

- *Encroachment into opposite lane*
- *Removal of some on-street parking*
- *Maintenance (snow removal)*
- *Driveway relocations*
- *Can be expensive*

B U N T & ASSOCIATES

Curb Extension

Horizontal Deflection Measure

Source: Bunt & Associates Photo Database

Applicability

Road Classification:

- *Local and collector streets*
- *Intersections*

Traffic Condition

- *All traffic volumes*
- *High pedestrian crossings*

Benefits

- *Shorter pedestrian crossing distance – better visibility*
- *Vehicular speed reduction*
- *Conflict reduction potential*
- *Aesthetics*

Disadvantages

- *Cyclists merge/share cross-section with vehicles*
- *Some loss of on-street parking in location of extension*
- *No real vertical or horizontal deflection*

BUNT & ASSOCIATES

Traffic Circle

Horizontal Deflection Measure

Source: Bunt & Associates Photo Database

Applicability

Road Classification:

- *Local and collector street intersections*

Locations to Avoid:

- *Intersections with high pedestrian volumes or left vehicle turns, particularly trucks and buses*
- *Intersections on collector streets with significantly higher traffic volumes on the collector street than on the intersecting street*

Benefits

- *Reduced vehicle speeds*
- *Improved safety*
- *Enhanced appearance of street*
- *Bi-directional traffic calming*

Disadvantages

- *Poor-design can encroach vehicles into unmarked crosswalks*
- *May require removal of on-street parking*
- *Must accommodate transit and emergency vehicles (e.g. truck apron)*
- *Maintenance (vegetation and snow-removal) considerations*

BUNT & ASSOCIATES

Roundabout

Horizontal Deflection Measure

Source: Bunt & Associates Photo Database

Applicability

Road Classification:

- *Collector streets and Arterials*

Traffic Condition:

- *Higher volume streets than for traffic circles*

Locations to Avoid

- *Steep grade approaches*
- *Imbalanced traffic flows*
- *Limited ROW available*

Benefits

- *Reduced crashes*
- *Reduced traffic speeds*
- *Aesthetic*
- *Bi-directional traffic calming*

Disadvantages

- *Expensive – require large right-of-way*
- *Must accommodate larger and emergency vehicles (e.g. truck apron)*
- *Maintenance (vegetation and snow-removal) considerations*
- *Inconvenient pedestrian and cyclist crossing locations*

BUNT & ASSOCIATES

Curb Radius Reduction

Horizontal Deflection Measure

Source: http://safety.transportation.org/htmlguides/peds/ex_images/ex_V-45.jpg

Applicability

Road Classification:

- *Local and collector residential streets*

Traffic Condition

- *All traffic volumes*

Locations to Avoid

- *Designated truck or emergency vehicle routes*
- *Right-turn locations on bus routes with frequent service*

Benefits

- *Speed reduction of right-turning vehicles*
- *Conflict reduction potential as pedestrian crossing distance is reduced and visibility is improved*

Disadvantages

- *Long vehicles may be forced to cross into adjacent travel lanes or mount the curb when turning, due to small curb radii*

BUNT & ASSOCIATES

On-Street Parking

Horizontal Deflection Measure

Source:http://www.eriding.net/media/photos/environment/congestion/040929_rfoster_mp_env_cong_street_parking2.jpg

Applicability

Road Classification:

•Local and collector residential streets with a maximum roadway width of 10m

Traffic Condition:

•All traffic volumes

Locations to Avoid:

•Areas with limited sight distance

•High concentration of driveways

•Along curbs within designated school zones

•Adjacent to unfenced playgrounds

•Poorly illuminated streets

Benefits

•Increased friction slows vehicle speeds through uncertainty

•Parked vehicles provide buffer between traffic and pedestrians

Disadvantages

•Parked vehicles can reduce visibility of pedestrians

•Increased risk of "dooring" cyclists

BUNT & ASSOCIATES

Chokers

Horizontal Deflection Measure

Source: www.trafficcalming.org

Applicability

Road Classification:

•Local and collector residential streets

•Mid-block locations

Traffic Condition

•All traffic volumes

•High pedestrian activity

Benefits

•Shorter pedestrian crossing distance – better visibility

•Potential speed and volume reduction

•Aesthetics

Disadvantages

•Cyclists merge/share cross-section with vehicles

•Some loss of on-street parking in location of extension

•No real vertical or horizontal deflection

BUNT & ASSOCIATES

Raised Median Island

Horizontal Deflection Measure

Source: Bunt & Associates photo database

Applicability

Road Classification:

•*Local and collector residential streets*

Traffic Condition

•*All traffic volumes*

Locations to Avoid

•Roads with >2 traffic lanes (one each direction)

Benefits

•*Vehicle speed reduction*

•*Conflict reduction potential as median islands can function as pedestrian refuge*

•*Entry treatment*

Disadvantages

•*May require removal of on-street parking*

•*Restricts access to driveways in one direction*

•*Speeds may increase if mid-block left-turn movements are not possible*

•*Poor design/maintenance can restrict sight distance*

BUNT & ASSOCIATES

Centre Island Narrowing

Horizontal Deflection Measure

Source:http://www.trafficcalming.org/centerislandnarrowrings.html

Applicability

Road Classification:

•*Local and collector residential streets*

Traffic Condition

•*All traffic volumes*

Locations to Avoid

•Roads with >2 traffic lanes

Benefits

•*Pedestrian refuge & shortened crossing distance*

•*Reduced road width influences driver behavior*

•*Entry treatment*

•*Aesthetics*

Disadvantages

•*May require removal of on-street parking*

•*Restricts access to driveways in one direction*

BUNT & ASSOCIATES

Others

Horizontal Deflection Measure

Source: www.trafficcalming.org

Lateral Shift

- *Similar to a chicane*
- *Deviates once, without returning to centreline*

Split Median

- *Similar to Centre Island Narrowing*
- *Split by an intersection*

B U N T & ASSOCIATES

Obstruction Measures

Description

Traffic calming measures which obstruct specific vehicle movements. These measures are typically used at intersections, but may also be applied in mid-block locations. They discourage short-cutting or through traffic to varying extents, depending on the nature and number of movements obstructed, and the presence of other traffic calming measures in place in the neighbourhood. These measures may also reduce conflicts, and may enhance the neighbourhood environment where landscaping is incorporated.

Types Include:

- Directional Closure
- Full Closure
- Diverter
- Intersection Channelization
- Raised Median through Intersection
- Right-in/ Right-out Island

Source: Canadian Guide to Neighbourhood Traffic Calming

B U N T & ASSOCIATES

Directional Closure

Obstruction

Source: http://safety.transportation.org/htmlguides/peds/ex_images/ex_V-18.jpg

Applicability

Road Classification:

•*Local streets at intersections with collector or arterial streets*

Traffic Condition

•*All traffic volumes*

Locations to Avoid

•Local street intersections with other local streets

Benefits

•*Traffic volume reduction*

•*Reduced pedestrian crossing distances*

•*Pedestrian and cyclist permeability maintained*

Disadvantages

•*Restricts resident and emergency access*

•*Diversion of traffic to parallel streets*

•*Some motorists may deliberately circumvent directional closures*

•*May complicate service vehicle routes*

BUNT & ASSOCIATES

Full Closure

Obstruction

Source: http://safety.transportation.org/htmlguides/peds/ex_images/ex_V-18.jpg

Applicability

Road Classification:

•*Local streets*

Traffic Condition

•*All traffic volumes*

Locations to Avoid

•Emergency access routes

Benefits

•*Traffic volume reduction (eliminates all short-cutting or through traffic)*

•*Pedestrian and cyclist permeability maintained*

•*Aesthetics*

Disadvantages

•*Restricts resident and emergency access*

•*Diversion of traffic to parallel streets*

•*Legal issues*

•*May complicate service vehicle routes*

•*Expensive*

BUNT & ASSOCIATES

Diverter

Obstruction

Source: http://safety.transportation.org/htmlguides/peds/ex_images/ex_V-18.jpg

Applicability

Road Classification:

- *Local streets*

Traffic Condition

- *Significant short-cutting traffic*

Locations to Avoid

- Emergency access routes

Benefits

- *Traffic volume reduction*
- *Pedestrian and cyclist permeability maintained*
- *Aesthetics*

Disadvantages

- *Restricts resident and emergency access*
- *May divert traffic to parallel streets*
- *May impact service vehicle routes*
- *Expensive*

BUNT & ASSOCIATES

Intersection Channelization

Obstruction

Source: Canadian Guide to Neigbourhood Traffic Calming

Applicability

Road Classification:

- *Local or collector streets, and arterial roadways*

Traffic Condition

- *All traffic volumes*

Benefits

- *Traffic volume reduction potential*
- *Vehicle-pedestrian conflict reduction due to islands reducing crossing distances* and *acting as refuge areas for pedestrians*

Disadvantages

- *Restricts resident access*
- *May divert significant volume of traffic to parallel streets*
- *Motorists may deliberately circumvent diverter in order to make the obstructed movement*
- *May complicate services (e.g. street cleaning)*

BUNT & ASSOCIATES

Raised Median Through Intersection

Obstruction

Source: http://www.walkinginfo.org/pedsafe/cm_images/cm18-image1.jpg

Applicability

Road Classification:

•Collector or arterial streets at intersections with local or collector streets

Traffic Condition

•All traffic volumes

Locations to Avoid

•Local streets

Benefits

•Traffic volume reduction

•Reduce intersection conflict points – improved safety

•Enhanced appearance of street

Disadvantages

•Restricts resident access

•May divert significant volume of traffic to parallel streets

•Motorists may deliberately circumvent raised median

•May obstruct emergency vehicles

•May complicate street cleaning routes

BUNT & ASSOCIATES

Right-In/ Right-Out Island

Obstruction

Source: Canadian Guide to Neigbourhood Traffic Calming

Applicability

Road Classification:

•Local and collector residential streets

Traffic Condition

•All traffic volumes

Locations to Avoid

•Rural cross-sections

Benefits

•Traffic volume reduction

•Reduced intersection conflict points – improved safety

•Pedestrian crossing refuge opportunity

Disadvantages

•Restricts resident access

•May divert significant volume of traffic to parallel streets

•Motorists may deliberately circumvent treatment

•May complicate street cleaning routes

BUNT & ASSOCIATES

Passive Measures

Description

Passive traffic calming measures include those treatments that do not physically change or obstruct the path of a vehicle. The objective of these measures is to change driver behavior. These measures can be ineffective if not supported, monitored, or enforced to ensure compliance.

Types Include:

- Gateways
- Signing
  - Maximum Speed
  - Right (Left) Turn Prohibited
  - One-Way
  - Stop
  - Through Traffic Prohibited
  - Traffic-Calmed Neighbourhood
  - Yield
- Road Narrowing
- Block Party / Social Gathering
- Street Reclamation
- Transverse Pavement Markings

BUNT & ASSOCIATES

Gateways

Passive

The entrance to a traffic calmed area requires special attention to make it clear to drivers that the area they are entering has speed restrictions.

Forms:

•Gates

•Roundabout

•Contrasting surface e.g. paint/pavers

•Road narrowing

•Reduced speed limit/signage

BUNT & ASSOCIATES

Maximum Speed Sign

Passive

Source: http://www.kamloops.ca/transportation/images/speedlimitsign.jpg

Applicability

Road Classification:

- *Local and collector residential streets*

Traffic Condition

- *All traffic volumes*

Benefits

- *Vehicle speed reduction (with regular police enforcement)*

Disadvantages

- *Requires regular police enforcement*
- *Inappropriate maximum speed can increase crashes - collisions tend to increase with increased difference between posted and operating speeds.*

BUNT & ASSOCIATES

Right (Left) Turn Prohibited Sign

Passive

Source: http://images.jupiterimages.com/common/detail/55/39/23303955.jpg

Applicability

Road Classification:

- *All*

Traffic Condition

- *All traffic volumes*

Benefits

- *Traffic volume reduction (with regular police enforcement)*

Disadvantages

- *Restricts resident access*
- *May divert significant volume of traffic to parallel streets*
- *Requires regular police enforcement*
- *Some motorists may violate turn prohibitions*

BUNT & ASSOCIATES

One-Way Sign

Passive

Source: http://www.btco.net/ghosts/signals/direcsigns/onewaytailhilton.jpg

Applicability

Road Classification:

- *Local and collector residential streets*

Traffic Condition

- *All traffic volumes*

Benefits

- *Eliminates traffic volume in one direction*
- *Vehicle-vehicle and vehicle-pedestrian conflicts at intersections reduced*
- *Noise Reduction*

Disadvantages

- *Diverts traffic to parallel streets*
- *May result in longer and less direct travel routes*
- *May result in increased vehicle speeds due to reduced volume*
- *May complicate transit and service vehicle routes*

BUNT & ASSOCIATES

Through Traffic Prohibited Sign

Passive

Source: http://www.dot.state.co.us/S_Standards/Sign_Layout_2004/Regulatory/GIF/No%20Through%20Traffic.gif

Applicability

Road Classification:

- *Local and collector residential streets*

Traffic Conditions:

- *All traffic volumes*

Benefits

- *Removal of short-cut traffic (with regular police enforcement)*
- *Noise reduction*

Disadvantages

- *May divert traffic to parallel streets*
- *Requires regular enforcement*
- *Frequently violated*

BUNT & ASSOCIATES

Traffic-Calmed Neighbourhood Sign

Passive

Source: http://www.students.bucknell.edu/projects/trafficcalming/Library/BlueTCsign%20big.jpg

Applicability

Road Classification:

- *Local and collector residential streets*

Traffic Condition

- *All traffic volumes*

Benefits

- *Speed and traffic volume reduction potential*
- *Increased sense of community*

Disadvantages

- *Not regulatory*
- *Often violated*

BUNT & ASSOCIATES

Yield Sign

Passive

Source: http://www.exchange3d.com/cubecart/images/uploads/aff186/Yield.jpg

Applicability

Road Classification:

- *Local and collector residential streets*

Traffic Condition

- *All traffic volumes*

Benefits

- *Collision reduction potential*

Disadvantages

- *May not prevent conflicts between motor vehicles and pedestrians (and cyclists), as motorists often yield only to other motor vehicles*

BUNT & ASSOCIATES

Road Narrowing

Passive

Source: http://www.thinkingtransport.org.au/images/bikelane.jpg
http://www.ci.kirkland.wa.us/dynamic/AssetFactory.aspx?did=2109

Purpose:

- *To disrupt driver comfort*
- *Physically or mentally narrow the vehicular laneways*

Actions:

- *Bike lanes*
- *Tree planting*
- *others*

Benefits

- *Increased driver awareness*
- *Other road users become more visible*

Disadvantages

- *Can be costly and timely (e.g. tree planting)*
- *Small gain (in terms of speed reduction) for investment*

BUNT & ASSOCIATES

Block Party / Social Gatherings

Passive

Application

Purpose:

- *To create a sense of place in the local community*
- *To "personalize" responsible driving*
- *DO NOT close street for the event – promote shared street concept!*

Benefits

- *Motorists' behavioural change potential*
- *Motorists' awareness increase*
- *Increased community involvement*

Disadvantages

- *Personality and social conflicts*

BUNT & ASSOCIATES

Street Reclamation

Passive

Source:http://www.lesstraffic.com/Programs/SR/SR.htm

Purpose

- *To influence driver psychology*

Application

- *Increase human activity at the street-front*
- *Increase driver uncertainty and intrigue*
- *Minimize traffic control devices*

Actions

- *Create activity nodes at intersections and street edges*
- *Fitness programs (increased activity)*
- *Organized street games and competitions*
- *Residents use the front yard*
- *Park on-street*
- *Supervised play on sidewalks*

BUNT & ASSOCIATES

Transverse Pavement Markings

Passive

Source:http://www.ecs.umass.edu/umasssafe/PDFS%20for%20Site/Speed%20Management/Passive%20Speed%20Control%20Devices.pdf

Application

Purpose:

- *To reduce vehicle speeds by creating the illusion of acceleration, causing drivers to slow down. This is done by spacing the markings at decreasing distances, so as a vehicle travels over the markings, it appears to the driver that he/she is approaching at an increasing rate*

Benefits

- *Speed reduction potential*
- *Motorists' awareness increase*

Disadvantages

- *May cause driver confusion*

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External Measures

Description

External traffic calming measures include those treatments that are not directly located within the problem area. The objective of these measures is to change driver behavior and actions outside the problem area in order to reduce vehicle speeds before entering the area or to discourage vehicles from entering the problem area altogether.

Types Include:

- Improving Signal Progression
- Access Management
- Increasing Capacity of External Roads

BUNT & ASSOCIATES

Improving Signal Progression

External

Source: http://www.richmond.ca/__shared/assets/Close-up_Traffic_Signal9563.jpg

Application

Purpose:

•To reduce the number of vehicles entering the problem area by improving the signal progression of the external roads, encouraging the vehicles to remain outside the problem area.

Benefits

•Traffic volume reduction inside the problem area

Disadvantages

•May be expensive and timely to analyze and adjust traffic signal operations on the external roads

BUNT & ASSOCIATES

Access Management

External

Source: See "Full Closure", "Diverter" and "Raised Median through Intersection" slides

Application

Purpose:

•To reduce the number of vehicles entering the problem area by blocking various access points to the area, making it more difficult to enter. These blocking methods can include directional and full closures, diverters, medians, etc.

Benefits

•Traffic volume reduction inside the problem area

Disadvantages

•May be expensive to implement

•May restrict resident access

•May impact service vehicle routes

BUNT & ASSOCIATES

Increasing Capacity of External Roads

External

Source: Bunt & Associates Photo Database

Application

Purpose:

•To reduce the number of vehicles entering the problem area by increasing the capacity of the external roads. These methods can include, but are not limited to, adding more lanes or adding new routes.

Benefits

•Traffic volume reduction inside the problem area

Disadvantages

•Expensive

•Increasing capacity will not necessarily lead to improved traffic flow on the external roads

BUNT & ASSOCIATES

Appendix B

Blank Questionnaire

TRAFFIC CALMING MASTER PLAN QUESTIONNAIRE

Please fill out the questionnaire below as completely as possible. All questions are optional and if you need more time, please feel free to take this home and fax, email, or mail back before Monday 15th October to:

Dave Newman, AScT
Town of Gibsons
474 South Fletcher Road
Box 340, Gibsons, BC V0N 1V0
Ph: 604-886-2274
Fax: 604-886-9735
Email: dnewman@gibsons.ca

BACKGROUND INFORMATION	
Name	
Address	
Did you attend the Open House? *(please circle)*	Yes / No

TRAFFIC CALMING PRIORITIES

Please use the table below or the attached map to locate up to 3 sites that you believe should be included for assessment in the Town of Gibsons Traffic Calming Master Plan and the reasons for your choice.

Site Location *(Street, from where to where)*	**Reason for Inclusion (e.g. excessive speed, high traffic volumes, pedestrian safety, school safety, etc)**
1.	
2.	
3.	

TRAFFIC CALMING SOLUTIONS

Based on your knowledge and the information presented at the Open House, what traffic calming solutions do you believe would solve the problems at each site you've identified on page 1, e.g. street narrowing, speed humps, roundabout, etc

Site	Possible Solutions
1.	
2.	
3.	
4.	
5.	

EVALUATION PROCEDURE

How should the Town decide whether traffic calming should be installed at all?

Please rate each response from 1 (lowest) to 5 (highest)

Based on resident request or petition only?	
Based on Council decision?	
Based on meeting minimum "warrants" for traffic calming installation?	

Once the need for traffic calming is established by the Town, how should these projects be prioritized?

Please rate each response from 1 (lowest) to 5 (highest)

In the order that they are received?	
Based on the number of households requesting traffic calming in their street?	
The relative need for traffic calming based on specific criteria (e.g. speed, traffic volumes, etc)?	

Other (provide details):

EVALUATION CRITERIA			
Please rate each of the criteria below from 1 (low priority) to 5 (high priority) depending on how important you believe each one is in evaluating sites for traffic calming.			
Resident support		Traffic volume	
Traffic speed		Crash history	
Cut-through traffic		Land use, e.g. in front of schools	
Noise		Prior attempts at enforcement or education have failed	
Others (provide details and rating):			

IMPLEMENTATION				
Who should vote on proposed traffic calming solutions?				
Residents fronting the street where traffic calming is to be installed?	☐	Yes	☐	No
Residents on adjacent streets that may be impacted by diverted traffic, etc?	☐	Yes	☐	No
The wider neighbourhood (e.g. residents within a 2-5 km radius)?	☐	Yes	☐	No
What level of support should be required to approve the implementation of traffic calming? *(please enter percentage)*				

FUNDING				
If warrants are met, what funding model should be applied by the Town of Gibsons? *Please rate each response from 1 (lowest) to 5 (highest)*				
Town develops and funds a single basic traffic calming option				
Town develops a number of options, which are voted on by residents. The preferred option is funded by the Town of Gibsons regardless of cost				
Town develops a number of options, which are voted on by residents. The Town funds the basic option and residents fund the "upgrades" to the preferred plan				
If traffic calming warrants are not met on your street, should the Town permit resident-funded traffic calming even if it means staff resources must be made available to assist in developing the plan?	☐	Yes	☐	No

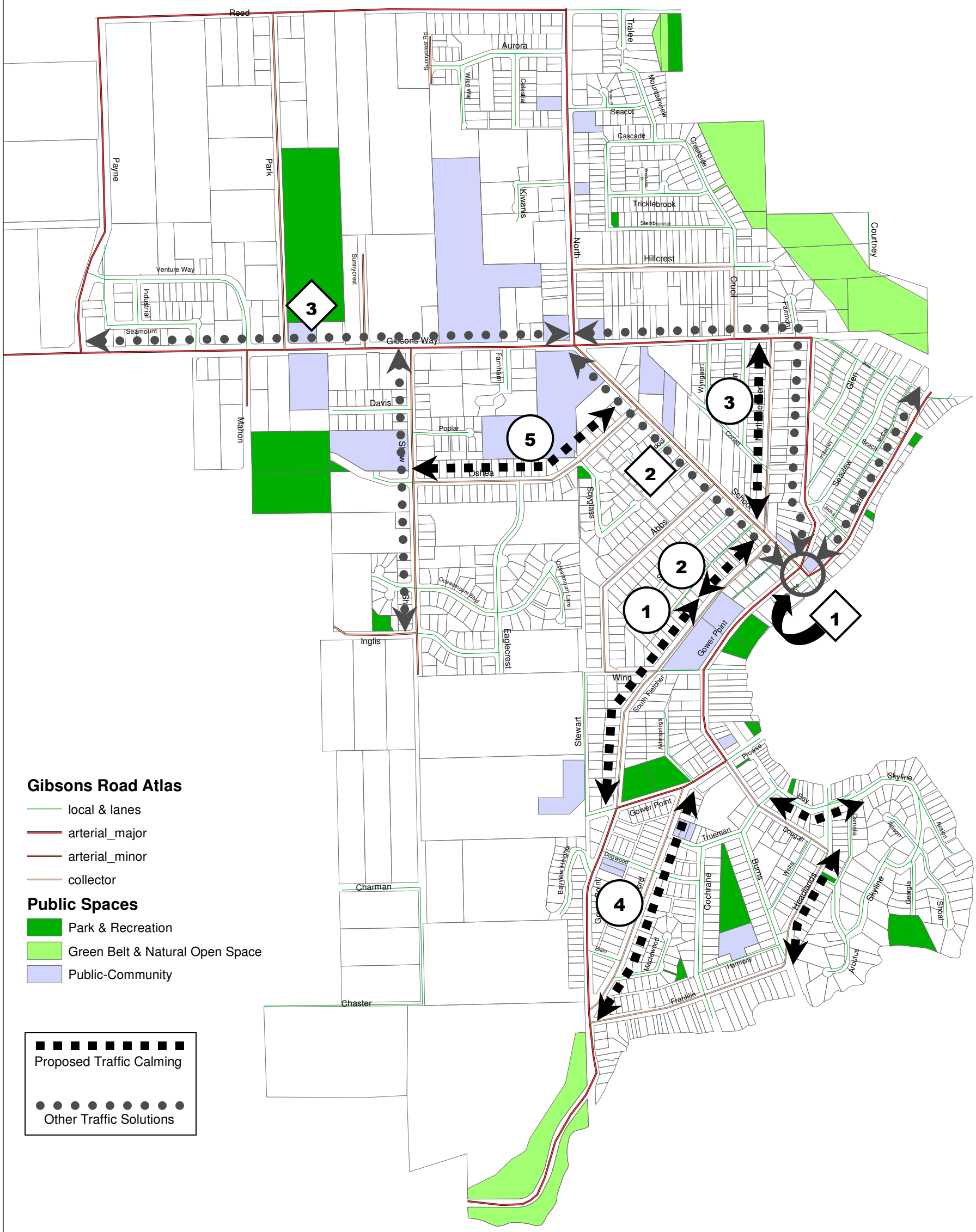
Do you have any additional comments that will assist the project team? *(add pages as necessary)*

_____

_____

Appendix C

Resident Transportation Concerns



Gibsons Road Atlas

- local & lanes
- arterial_major
- arterial_minor
- collector

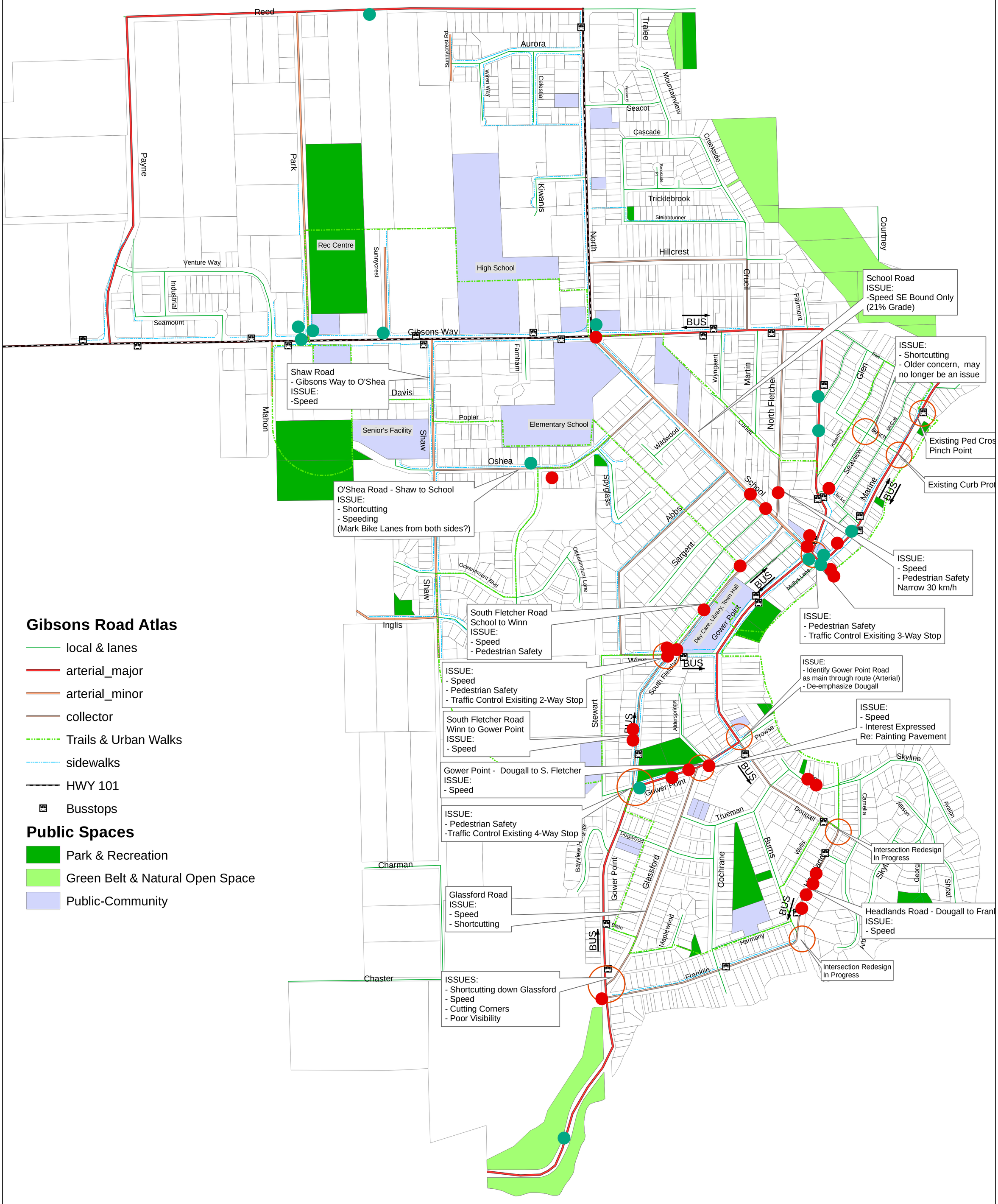
Public Spaces

- Park & Recreation
- Green Belt & Natural Open Space
- Public-Community

- Proposed Traffic Calming
- Other Traffic Solutions

Traffic Concerns - 2007

Traffic Calming - 1st Priority Site

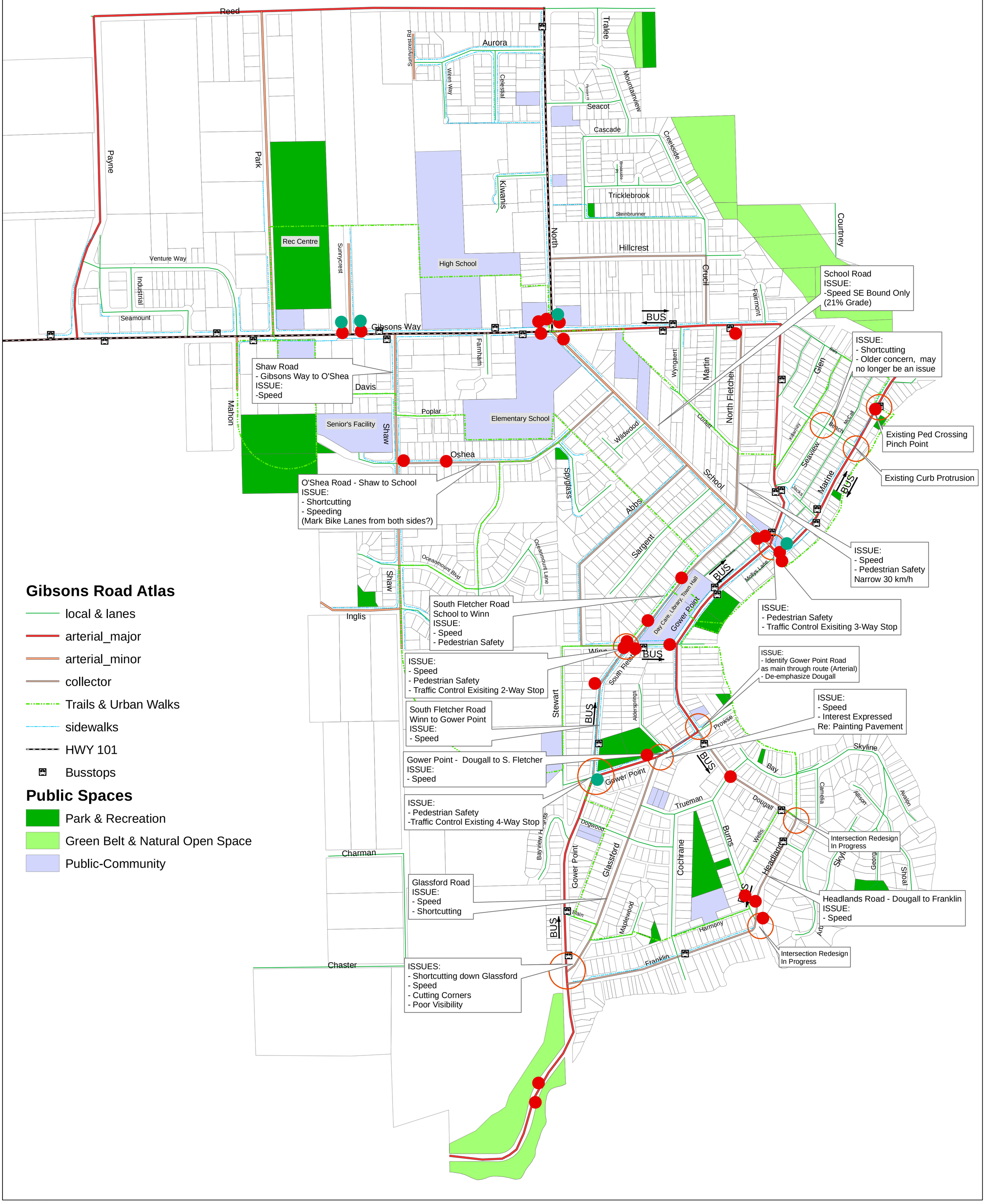


Traffic Calming Master Plan Study

- Traffic Issues
- Street Network
- Public Spaces
- Sidewalks
- BusStops & Routes

P:\data\Maps\TrafficCalmingStudy.mxd OCT 2007

Traffic Calming - 2nd Priority Site



Gibsons Road Atlas

- local & lanes
- arterial_major
- arterial_minor
- collector
- Trails & Urban Walks
- sidewalks
- HWY 101
- Busstops

Public Spaces

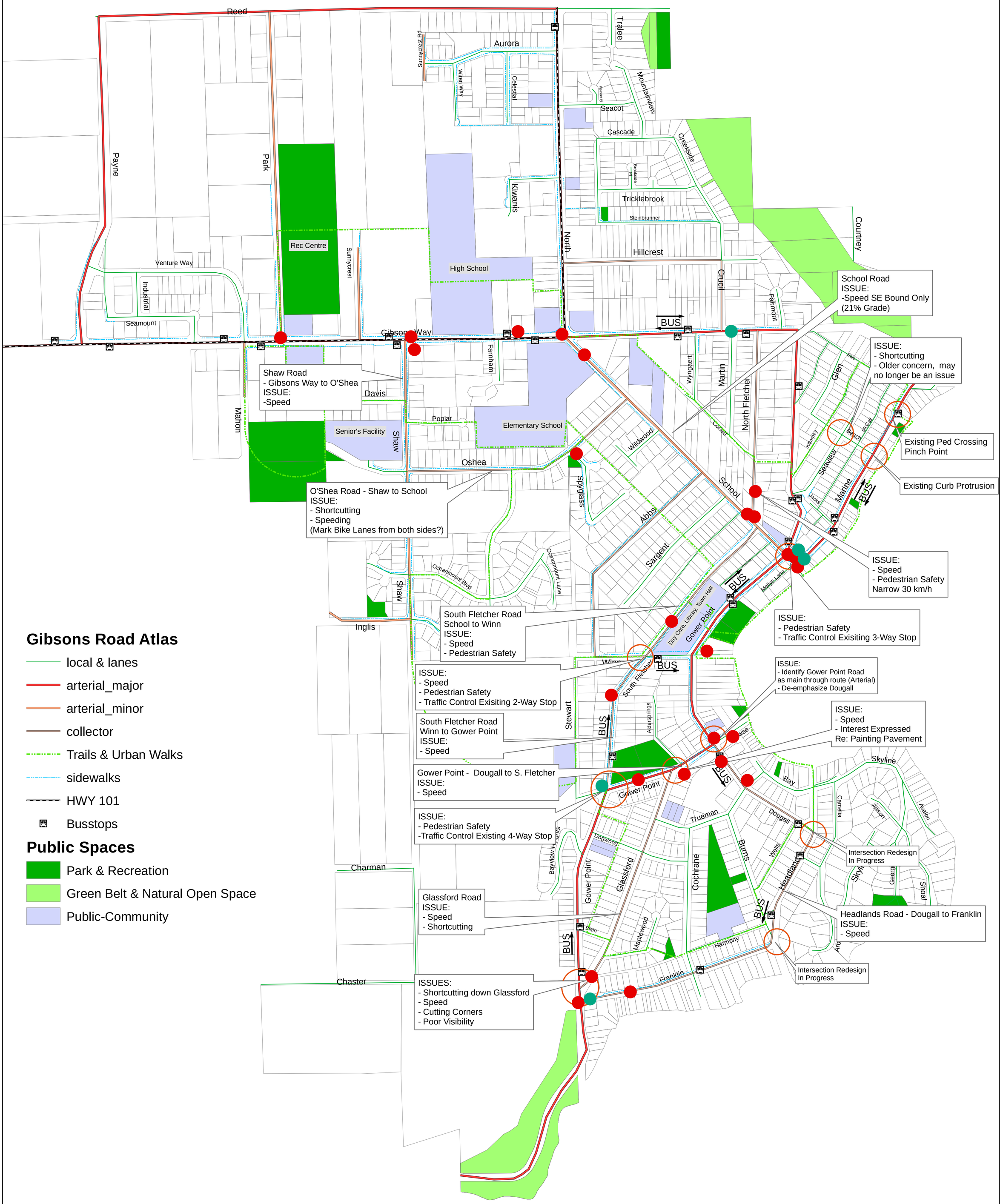
- Park & Recreation
- Green Belt & Natural Open Space
- Public-Community

Traffic Calming Master Plan Study

- Traffic Issues
- Street Network
- Public Spaces
- Sidewalks
- BusStops & Routes

P:\data\Maps\TrafficCalmingStudy.mxd OCT 2007

Traffic Calming - 3rd Priority Site



Traffic Calming Master Plan Study

- Traffic Issues
- Street Network
- Public Spaces
- Sidewalks
- BusStops & Routes

P:\data\Maps\TrafficCalmingStudy.mxd OCT 2007

Appendix D

Results of Questionnaire

TRAFFIC CALMING MASTER PLAN QUESTIONNAIRE
Summary of Results

Notes:
1. Questions related to traffic calming priorities and traffic calming solutions have been summarized elsewhere.
2. For questions where priority from 1 (low priority) to 5 (high priority) was given by respondents a points core equal to 1*#responses for priority 1 + 2*#responses for priority 2 + … + 5*#responses for priority 5 was given – the highest score is the most preferred response.

EVALUATION PROCEDURE	
How should the Town decide whether traffic calming should be installed at all? *Please rate each response from 1 (lowest) to 5 (highest)*	
Based on resident request or petition only?	**31 pts**
Based on Council decision?	**42 pts**
Based on meeting minimum "warrants" for traffic calming installation?	**25 pts**
Once the need for traffic calming is established by the Town, how should these projects be prioritized? *Please rate each response from 1 (lowest) to 5 (highest)*	
In the order that they are received?	**48 pts**
Based on the number of households requesting traffic calming in their street?	**36 pts**
The relative need for traffic calming based on specific criteria (e.g. speed, traffic volumes, etc)?	**22 pts**

EVALUATION CRITERIA			
Please rate each of the criteria below from 1 (low priority) to 5 (high priority) depending on how important you believe each one is in evaluating sites for traffic calming.			
Resident support	**48 pts**	Traffic volume	**37 pts**
Traffic speed	**34 pts**	Crash history	**31 pts**
Cut-through traffic	**44 pts**	Land use, e.g. in front of schools	**17 pts**
Noise	**24 pts**	Prior attempts at enforcement or education have failed	**28 pts**
Others (provide details and rating):			
Visual enhancement		Restore Village ambiance	
Cyclist priorities			

IMPLEMENTATION				
Who should vote on proposed traffic calming solutions?				
Residents fronting the street where traffic calming is to be installed?	**100%**	Yes	**0%**	No
Residents on adjacent streets that may be impacted by diverted traffic, etc?	**95%**	Yes	**5%**	No
The wider neighbourhood (e.g. residents within a 2-5 km radius)?	**69%**	Yes	**31%**	No
What level of support should be required to approve the implementation of traffic calming? *(please enter percentage)*	40-50% 1 response 51% 5 responses 65%+ 1 response 75%+ 1 response 70% fronting/50% wider			

FUNDING				
If warrants are met, what funding model should be applied by the Town of Gibsons? *Please rate each response from 1 (lowest) to 5 (highest)*				
Town develops and funds a single basic traffic calming option				**27 pts**
Town develops a number of options, which are voted on by residents. The preferred option is funded by the Town of Gibsons regardless of cost				**38 pts**
Town develops a number of options, which are voted on by residents. The Town funds the basic option and residents fund the "upgrades" to the preferred plan				**45 pts**
If traffic calming warrants are not met on your street, should the Town permit resident-funded traffic calming even if it means staff resources must be made available to assist in developing the plan?	**75%**	Yes	**25%**	No

The results of the questionnaire show there is strong support for traffic calming sites to be identified by Council or based on resident request/petition. There appears lower support for the implementation of a traffic calming warrant to identify sites for evaluation.

It is also obvious from the results that residents would prefer traffic calming projects to be evaluated in the order that they are received. There was also strong support for considering the number of households requesting traffic calming on the street (as a proportion of all households on the street). Quantitative measures for prioritizing sites were again not considered as important by respondents. Nevertheless, residents were asked to rate different evaluation criteria, which were then ranked:

1. Resident support;
2. Cut-through traffic;
3. Traffic volume;
4. Traffic speed;

5. Crash history;
6. Prior attempts at enforcement or education;
7. Noise;
8. Land use;
9. Others: aesthetics, restoration of Village ambiance, cyclist priorities.

In terms of implementation, survey respondents replied strongly that fronting residents and those residents on adjacent streets that may be impacted by diverted traffic should vote on proposed traffic calming solutions. Although the wider community received a majority of support to be included in the voting process, the response was much less affirmative than fronting or adjacent residents.

All but one respondent to the question regarding the level of support required for approval requested greater than 50% approval. One suggestion (supported by other literature) was to require 70% approval on the fronting street and 50% approval amongst the wider community.

The preferred funding option was that the Town develop a number of traffic calming options, which are voted on by residents. The Town then funds the basic option and residents are given the option to fund the "upgrades". Reasonably strong support was also given to the Town funding the preferred option regardless of cost. The Town funding only the basic option with no opportunity for resident funding realized the least amount of support. Seventy-five percent of respondents believed that resident funded traffic calming opportunities should be made available.

Appendix E

Traffic Calming Policy Literature Review

B U N T
& ASSOCIATES

August 30, 2007 **4653.01**

Town of Gibsons
PO Box 340
Gibsons, BC V0N 1V0

Attn: Dave Newman/Bryan Shoji (by email)

Transportation Planners and Engineers

Re: Town of Gibsons Traffic Calming Policy Literature Review

As part of the Town of Gibsons Traffic Calming Master Plan project, a literature review of traffic calming policies adopted by other municipalities in southwestern British Columbia, other parts of Canada, and a number of locations in the United States has been undertaken and summarized in this report.

The types of traffic calming policies available or in practice are almost as numerous as agencies reviewed; some have only small variations, while others are atypical. At this stage, this report provides a literature review along with some discussion on the key considerations in developing a traffic warrant. A recommended traffic calming policy will be developed in consultation with Town of Gibsons staff upon review of this document.

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1.0 What are Traffic Calming Warrants?

Traffic calming warrants are procedures established by communities to objectively evaluate requests for neighbourhood traffic calming. Traffic calming warrants include minimum requirements that should be met before a given device or preparation of a traffic calming plan is considered for development and/or funding. Warrants are just one component of an overall traffic calming policy which also includes guidelines about initiation of projects, process and funding.

Warrants are often applied to either a) identify sites or b) to prioritize traffic calming projects within overall traffic calming programs, or c) both. They are generally categorized as:

- Either pro-active or reactive warrants; and
- Either localized or areawide warrants.

The Institute of Transportation Engineers (ITE) prepared a review of the effectiveness of traffic calming programs with various combinations of these characteristics (Reference 1); the results of this review are illustrated in **Table 1**. The majority of traffic calming programs reviewed by ITE were reactive, spot treatments. These are considered to be 'somewhat successful' programs, however there are a number of reasons to move to a more proactive approach. Seattle, Washington is an example of such a program, which was changed from a reactive spot treatment to a proactive spot treatment in considering the implementation of traffic circles. The new program identifies locations with the highest crash histories, which are then surveyed for local resident support of traffic calming. The City feels that this ensures a more equitable procedure where areas with the most serious problems are addressed, rather than only those with the loudest voice (1, 6).

Table 1: Relative Effectiveness of Traffic Calming Programs (1)

	Reactive	Proactive
Spot treatment	Somewhat successful	More successful
Areawide treatment	Less successful	Most successful

The advantages and disadvantages of localized and area-wide schemes should also be considered in developing a traffic calming program. The City of Vancouver has implemented a number of area-wide traffic calming plans and lists the advantages of this approach as "achieving a balance of traffic calming measures and neighbourhood accessibility, encouraging interaction,

and building neighbourhood understanding and consensus" (8). Area-wide schemes also reduce the effect or at least the perception that problems are merely being shifted to nearby streets (1). The major disadvantages of area-wide schemes are that they are time consuming and require significant staff resources.

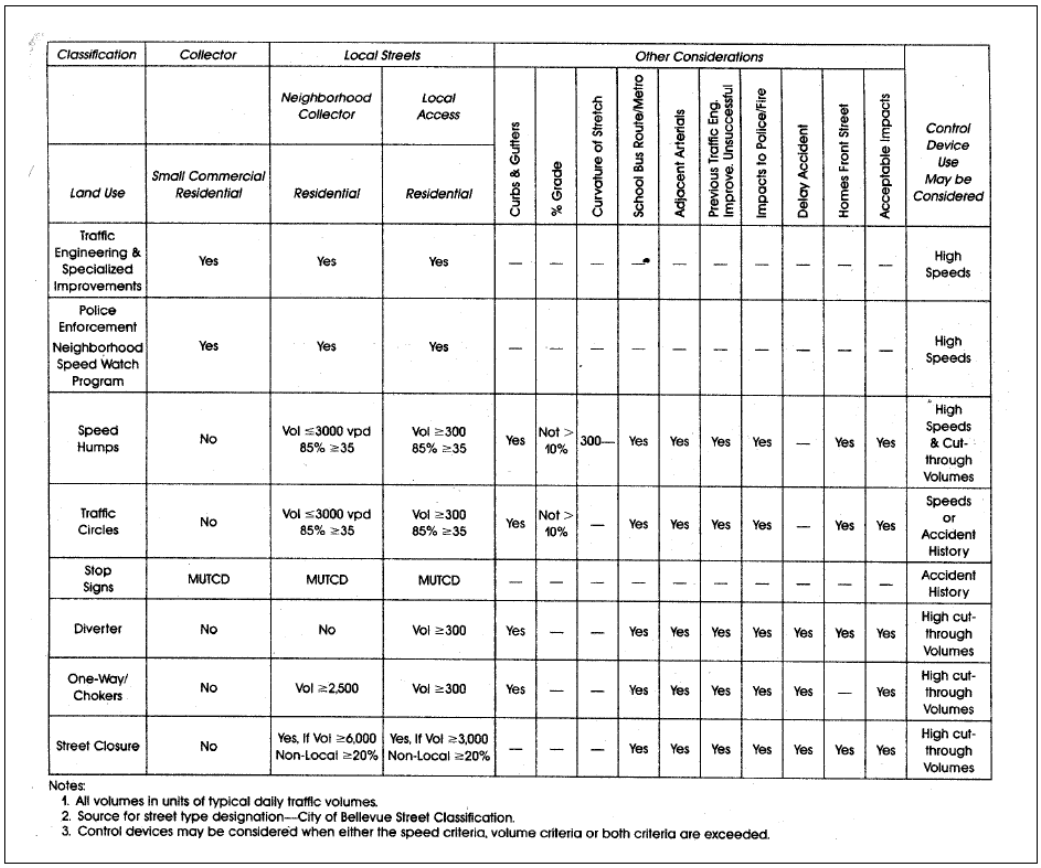
2.0 Types of Traffic Calming Warrants

There are various types of traffic calming warrants:

- General warrants: where locations must meet a rigid set of criteria, typically based on quantitative minimums, before a resident request will be considered;
- Specific measure warrants: these are warrants that are applied to specific traffic calming devices, e.g. warrants for the installation of speed humps;
- Action warrants: warrants used to identify locations where action must be taken to address a serious problem. These are compared to "problem warrants" that identify locations of lower urgency.

It is important to note that interpretation of the term "warrant" is often misused or misinterpreted to mean that if the project meets the warrants it is automatically recommended for traffic calming. Warrants should be interpreted to mean that if a project meets the warrant criteria it should be further considered for traffic calming and probably more importantly, if it does not meet the warrant then it should not be considered for traffic calming.

Use of "Guidelines" is an alternative to use of warrants that often use the same criteria but are more qualitative than quantitative. Preferred measures are suggested rather than mandated under this arrangement. An example of this application is the traffic calming "control matrix" developed by Bellevue, Washington as shown in **Exhibit 1**.



Classification	Collector	Local Streets		Other Considerations										
		Neighborhood Collector	Local Access	Curbs & Gutters	% Grade	Curvature of Stretch	School Bus Route/Metro	Adjacent Arterials	Previous Traffic Eng. Improve. Unsuccessful	Impacts to Police/Fire	Delay Accident	Homes Front Street	Acceptable Impacts	Control Device Use May be Considered
Land Use	Small Commercial Residential	Residential	Residential											
Traffic Engineering & Specialized Improvements	Yes	Yes	Yes	—	—	—	—	—	—	—	—	—	—	High Speeds
Police Enforcement Neighborhood Speed Watch Program	Yes	Yes	Yes	—	—	—	—	—	—	—	—	—	—	High Speeds
Speed Humps	No	Vol ≤3000 vpd 85% ≥35	Vol ≥300 85% ≥35	Yes	Not > 10%	300—	Yes	Yes	Yes	Yes	—	Yes	Yes	High Speeds & Cut-through Volumes
Traffic Circles	No	Vol ≤3000 vpd 85% ≥35	Vol ≥300 85% ≥35	Yes	Not > 10%	—	Yes	Yes	Yes	Yes	—	Yes	Yes	Speeds or Accident History
Stop Signs	MUTCD	MUTCD	MUTCD	—	—	—	—	—	—	—	—	—	—	Accident History
Diverter	No	No	Vol ≥300	Yes	—	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High cut-through Volumes
One-Way/ Chokers	No	Vol ≥2,500	Vol ≥300	Yes	—	—	Yes	Yes	Yes	Yes	Yes	—	Yes	High cut-through Volumes
Street Closure	No	Yes, If Vol ≥6,000 Non-Local ≥20%	Yes, If Vol ≥3,000 Non-Local ≥20%	—	—	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High cut-through Volumes

Notes:
1. All volumes in units of typical daily traffic volumes.
2. Source for street type designation—City of Bellevue Street Classification.
3. Control devices may be considered when either the speed criteria, volume criteria or both criteria are exceeded.

MUTCD = Manual on Uniform Traffic Control Devices for Streets and Highways; vpd = vehicle per day

Exhibit 1: Bellevue Traffic Calming Control Matrix (1)

A two-stage warrant procedure can be employed to prioritize traffic calming projects, with "primary" and "secondary" criteria. First, the potential traffic calming project is evaluated to determine if it meets the warrants for further consideration, thereby making the "long list" of potential projects. Then, using an additional or expanded set of warrant criteria, a rating/ranking system is employed to determine priority for project funding. This approach is attractive as it allows weighting of various warrant criteria, e.g., traffic volume vs. speed (2) to reflect individual community objectives or values.

3.0 What Criteria are Most Commonly used in Warrants?

There are a many quantitative and qualitative criteria that can be included in traffic calming warrants. Based on the traffic calming warrants reviewed as part of this study, the four most common criteria are described below. The first two, traffic volume and speed, are common to the vast majority of traffic calming programs and are typically used as the primary criteria to determine whether a traffic calming program should be considered further by a community.

1. Traffic Volume

The most common warrant criterion is traffic volume, typically Average Daily Traffic volume (ADT). This measure is usually assigned threshold limits that, if exceeded, contribute towards meeting the traffic calming warrant. Thresholds are set according to the street's functional classification. ADT is best measured using automatic counters (road tubes) which are left in place for at least three weekdays and preferably one week. Some traffic volume warrants include peak hour volumes, but this is not the norm.

2. Traffic Speed

Traffic speed is the next most common criteria, usually measured in relation to the difference between the posted speed limit and the measured 85th percentile speed on a specified section or roadway, which represents the speed at which 85 percent of vehicles are traveling at or below. Similar to the traffic volume criterion, threshold values are established relative to the 85th percentile that if exceeded contribute towards meeting the traffic calming warrant. Traffic speed data can be manually collected or collected using automatic counters which are set a specified distance apart and record the time to travel between these two fixed points.

3. Crash Experience

The assessment of crash experience and its timing in the evaluation process varied amongst the agencies reviewed. Measures for assessing crash experience are various and include crash frequency (i.e. number of crashes), average number of crashes per year, crashes per vehicle-km, crashes per unit length of roadway, etc. In assessing traffic calming study locations, crash experience may be limited only to those crashes that were deemed "preventable" with the installation of traffic calming. For example, the City of Seattle uses the average number of recorded "correctable" crashes over a three year period as a criteria towards its traffic circle installation warrants. The City however also allocates a lower number of points towards "non-correctable" and/or midblock crashes per year.

Other agencies such as the City of Surrey and the Corporation of Delta are more qualitative in their use of traffic safety applying it more generally to rank solutions that "address a known safety problem" or that have the potential for "improved safety performance". The City of Toronto includes a number of "safety considerations" in its primary ranking system not only related to traffic safety, that include assessing pedestrian safety through the installation of sidewalks and the impact of traffic calming on emergency services. The number of "preventable" collisions within a 3-year period is considered in ranking projects.

The criteria to be adopted and its location in the evaluation process (i.e. used as a primary measure or as a secondary, prioritization measure) needs to be determined by the agency. One drawback of this criterion as a quantitative measure is that substantial historical data and analysis is required, so quite often it is a secondary measure or a qualitative approach based on experience and research.

4. Public Opinion

Common to almost all traffic calming warrants and all warrants reviewed as part of this study is the measurement of public opinion to a proposed traffic calming plan, which is typically used as a secondary or prioritization measure. Most traffic calming assessments are initiated by public request and the support of local residents is usually mandatory in implementing a traffic calming plan. The difficulty with this criterion is determining what "support" means and how to measure it.

Typical methods of measuring public support include public consultation with feedback forms, ballot, petition, and survey. Petitions can be administered by interested local residents and so reduce the staff time required, however they are not considered the most appropriate indicator due to the feeling some residents have of being pressured or misled into signing. Petitions also give no indication of those not in favour of traffic calming. Consultation, ballot, and survey methods are more comprehensive but require more staff time.

The margin of support required for an initiative to be approved needs to be established. All municipalities reviewed in the Lower Mainland require at least a 50 percent response rate and of those households who respond, at least 50 percent are required to be in favour of the measure. A study of traffic calming warrants conducted by the City of San Diego reviewed 42 public agencies and found that the median approval rating required for approval of a traffic calming measure was 67 percent and ranged between 51 and 80 percent (1). Ballot procedures that use the respondents as a representative sample of project support should require a 'super-majority' (this number can be calculated based on sampling theory for a given sample size - see reference 1, which refers to L.M. Rea and R.A. Parker, *Designing and Conducting Survey Research,* Jossey-Bass, San Francisco, CA, 1992, pp. 107–124.) to be confident of neighborhood support as a whole.

The public opinion process needs to consider the size of the 'impacted area'. Most agencies include all properties on the frontage street and a number of agencies include residents on flanking streets and/or parallel streets where potentially diverted traffic may shift. This definition may be determined depending on the traffic calming device proposed (e.g. a closure will impact parallel streets that will likely receive an increase in traffic volumes). Often times frontage street opinions are separated from flanking and parallel street responses and even given a higher weighting factor in measuring "support". It is noted that support is usually highest on the street tabled for improvements.

Finally, when surveying support for traffic calming measures, it is important to advise those answering the survey as to whether the measures would be funded by the City, funded by the local residents directly through a local improvement program, or jointly funded. Often considered a true test of the value of traffic calming is the neighborhood's willingness to pay for the treatment. Support for traffic calming varies considerably depending on who pays for the installation of measures.

5. Other Criteria

There are a myriad of other quantitative and qualitative criteria that can be considered as part of a traffic calming warrant. These include but are not limited to:

- Amount of percentage of "cut-through" traffic volume during peak periods;
- Diverted traffic;
- Adjacent (sensitive) land use e.g. schools, parks, and community facilities;
- Noise;
- Heavy vehicle traffic;
- Prior attempts at applying enforcement, educational, or low-cost traffic calming techniques;
- Source of funding.

It is worthwhile examining a number of these criteria in more detail.

Traffic diversion can be a positive outcome of traffic calming (1). Examples of good traffic diversion include redistributing traffic onto roadways with higher functional classification, i.e. traffic calming on a local street diverting traffic to a collector street, or traffic on a collector street diverting onto an arterial road. Balancing flows more evenly across streets with the same functional classification can also be a positive outcome of diverted traffic. Traffic diversion is likely to be unpopular amongst residents that live on streets impacted by diverted traffic. A number of agencies, including the City of Portland, Oregon (9) have incorporated features into their traffic calming programs that review and assess the impact of diverted traffic post-implementation (refer to reference 9 for more detail). Area-wide traffic calming programs address diverted traffic issues up front by considering the neighbourhood holistically in preparing a traffic calming solution.

Adjacent land uses fronting the study street are often also a key consideration either in the identification or ranking of traffic calming projects given the community sensitivity to vulnerable road users generated by land uses such as parks, schools, seniors centres, and community centres.

A number of warrants reviewed as part of this study required that some alternative to engineered traffic calming solutions be already tried at the site prior to further investigation of engineering solutions. For example, the City of Portland refers all traffic calming requests related to speed first to the Police Bureau, who conduct speed enforcement, which if found to be a problem is then referred back to the traffic engineering department. The District of Saanich assigns points in its evaluation to sites that have implemented education programs and/or enforcement programs to no avail.

4.0 Alternatives to Warrants

There are both advantages and disadvantages to adopting traffic calming warrants. The primary advantage is being able to provide a transparent, objective procedure that attempts to deliver a fair and equitable process to residents. This also serves to reduce political pressure that can be placed on a more subjective procedure. The use of warrants also tends to reduce costs, particularly associated with staff time in assessing each application, through standardization of the assessment procedure.

However, a number of industry professionals believe that the advantages of adopting a standard traffic calming warrant do not account for a number of significant issues including:

- Identifying the uniqueness of each location;
- Community and political sensitivity (e.g. pressure exerted by a community grieving a traffic crash);
- Reduced opportunity for creativity;
- Inappropriate criteria, i.e. can a criteria be set that is neither too easy nor too hard to meet;
- Inappropriate importance placed on certain criteria.

The City of Gainsville, Florida (3) reviewed speed and traffic volumes associated with local traffic calming requests and found that there were very few trends evident in the data that suggested a definitive set of quantitative traffic calming warrants could be developed. Based on this, the City decided to evaluate each situation independently; however, staff formulated a set of guidelines that use traffic data to identify when traffic calming devices may be appropriate. The emphasis of project success was placed more on collecting appropriate data that addressed the issues identified by residents, flexibility on the part of the Traffic Engineering Department, and supportive public response.

Another alternative to traffic calming warrants presented by Lockwood (4) is to identify traffic calming locations through three 'tests of appropriateness' (shown on **Exhibit 2**). Locations are then prioritized based on a set of qualitative and quantitative criteria that are developed through an holistic community consultation process (perhaps a forum similar to the community open house to be conducted for the Town of Gibsons), where residents voice, vote, and weight the criteria that are most important to them. This method reduces the amount of community consultation that needs to be provided to each project and promotes initial community buy-in, however it still limits the individuality of each location.

Tests of Appropriateness	
Test	**Question**
1	Is the street in a built up area or an approach to one? If no, then traffic calming is inappropriate.
2	Do the street's land uses (homes, retail, etc.) front the street? Do vulnerable street users (e.g. cyclists, pedestrians, school children, elderly, etc) use the street, or would they use it following traffic calming? Is the area vulnerable or sensitive (e.g. historic, tourist-related, hospital zone, etc)? If the answer is no to all three questions, then traffic calming is inappropriate.
3	Is the immediate community supportive? In other words, there is a general consensus among the people along the street that a problem exists that can be mitigated by traffic calming (e.g. speeding, safety perceptions, aesthetics, accessibility, intrusion effects, etc)? If no, then traffic calming is inappropriate.

Exhibit 2: Traffic Calming Tests of Appropriateness (4)

5.0 Case Studies of Traffic Calming Programs

This section reviews traffic calming policies implemented in the Lower Mainland, other parts of Canada, and the Pacific Northwest region of the USA.

City of Seattle Traffic Circle Program

Type of Policy Proactive Localized Program

Warrant Type Point-Score

The City of Seattle traffic circle program (6) has been mentioned previously in this literature review and includes a step-wise warrant process as follows:

1. Community request (either an individual or a group)
2. Preliminary Safety Analysis: evaluates crash history. If the location ranks sufficiently high, the contact person is notified with a petition area of affected properties.
3. Petition Process: Signatures of approval must be gathered from at least 60% of households within one block of the proposed traffic circle (only one signature per household)
4. Traffic Safety Analysis: collection and review of crash history, traffic volume, and traffic speed data, which is evaluated with a weighted points procedure as shown in **Table 2**.

Table 2: City of Seattle Traffic Safety Evaluation Criteria

Factor	Points
Recorded correctable accidents for past 3 years (accidents per year)	
0.5–0.875	1
0.876–1.250	2
1.251–1.625	3
1.626–2.000	4
2.001–2.375	5
2.376–2.750	6
If "non-correctable" accidents exceed an average of 2 per year	½
If accidents at midblock exceed an average of 2 per year	½
Average daily volume (vehicles per day)	
500–1,100	½
1,101–1,700	1
1,701–2,300	1 ½
2,301–2,701	2
85th percentile speed (miles per hour)	
26–29	½
29.1–32	1
32.1–35	1 ½
35.1–38	2
38.1–41	2 ½
41.1–44	3

City of Surrey Traffic Calming Need Review

Type of Policy Reactive Localized Program

Warrant Type Quantitative Thresholds

Bunt and Associates was involved in the establishment of a set of traffic calming warrants adopted by the City of Surrey (5). A "Traffic Calming Need Review" is initiated through the receipt of at least 10 resident complaints and is applicable to only residential collector and local streets.

The Need Review is evaluated using the three criteria of total daily traffic volume, 85th percentile traffic speed, and short-cutting traffic, for which the City collects site-specific data. The data collection effort is limited by adopting a step-wise approach, i.e. if the site does not meet the threshold of the first

criteria, no more data need be collected for the other criteria, similarly for the second criteria. This step-wise approach was selected in order to minimize the costs of data collection and analysis, and effort by City staff. The thresholds for these criteria are set at:

Residential Collector Roads

- Daily traffic volume: minimum of 3,000 vehicles/day and;

One or more of the following is true:

- 85th percentile traffic speed: 7km/h higher than the posted speed limit;
- Short-cut volume: greater than 100 vehicles per hour during the peak hour of traffic or comprises more than 30% of total peak hour traffic volume.

Residential Local Roads

- Daily traffic volume: minimum of 500 vehicles/day and;

One or more of the following is true:

- 85th percentile traffic speed: 7km/h higher than the posted speed limit;
- Short-cut volume: greater than 50 vehicles per hour during the peak hour of traffic or comprises more than 50% of total peak hour traffic volume.

Residents are advised of the results of the review and those sites not meeting warrants are not placed on the City's priority list. However, residents are able to continue to pursue "resident-funded" traffic calming measures.

Projects meeting the criteria are then prioritized based on:

- The extent that warrant thresholds are exceeded;
- Whether traffic calming could address a known safety problem;
- Whether there are specific frontage land uses with vulnerable road users, e.g. schools, parks, etc;
- Whether the street is part of a designated bicycle route; and
- Whether there are sidewalks on both sides of street.

The City of Surrey then develops a traffic calming plan for sites identified at the top of the priority list, which is distributed to every household in the affected area along with a postage-paid ballot card to be returned within 3 weeks. A response of 60% in favour of the treatment is required as well as at least 50% approval from residents on the fronting street. If such levels of approval are not forthcoming, residents are still welcome to pursue a "resident funded" traffic calming scheme.

The overall "Needs Review" work flow is included on **Exhibit 3**.

In the case of a "resident funded" traffic calming scheme, a Traffic Calming Committee is first established, which is comprised of no more than 5 residents. This committee than liaises with City staff to develop the wording for a petition, which is used to determine the level of interest in a self-funded project.

The petition is distributed to all residents in the affected area, and the results are returned to the City. Approval by at least 67% of residents is needed to initiate the development of a traffic calming plan. If successful, the City and the Traffic Calming Committee will work together to develop a traffic calming plan, along with a rough construction cost. This information, along with a "reply card" will be given to all residents in the affected area. At this time, a public meeting may also be held by the City to provide further information to the residents. For the traffic calming plan to be considered for implementation, at least 67% of all residents in the affected area must support both the traffic calming plan, as well as the resident self-funding of the plan.

If the ballot is successful, the Traffic Calming Committee must provide the City with a firm commitment with a certified cheque or letter of credit for the full amount of the estimated construction cost. Once the funding is in place, the City schedules the construction of the traffic calming measures, which is typically within 6 months of receipt of the funding.

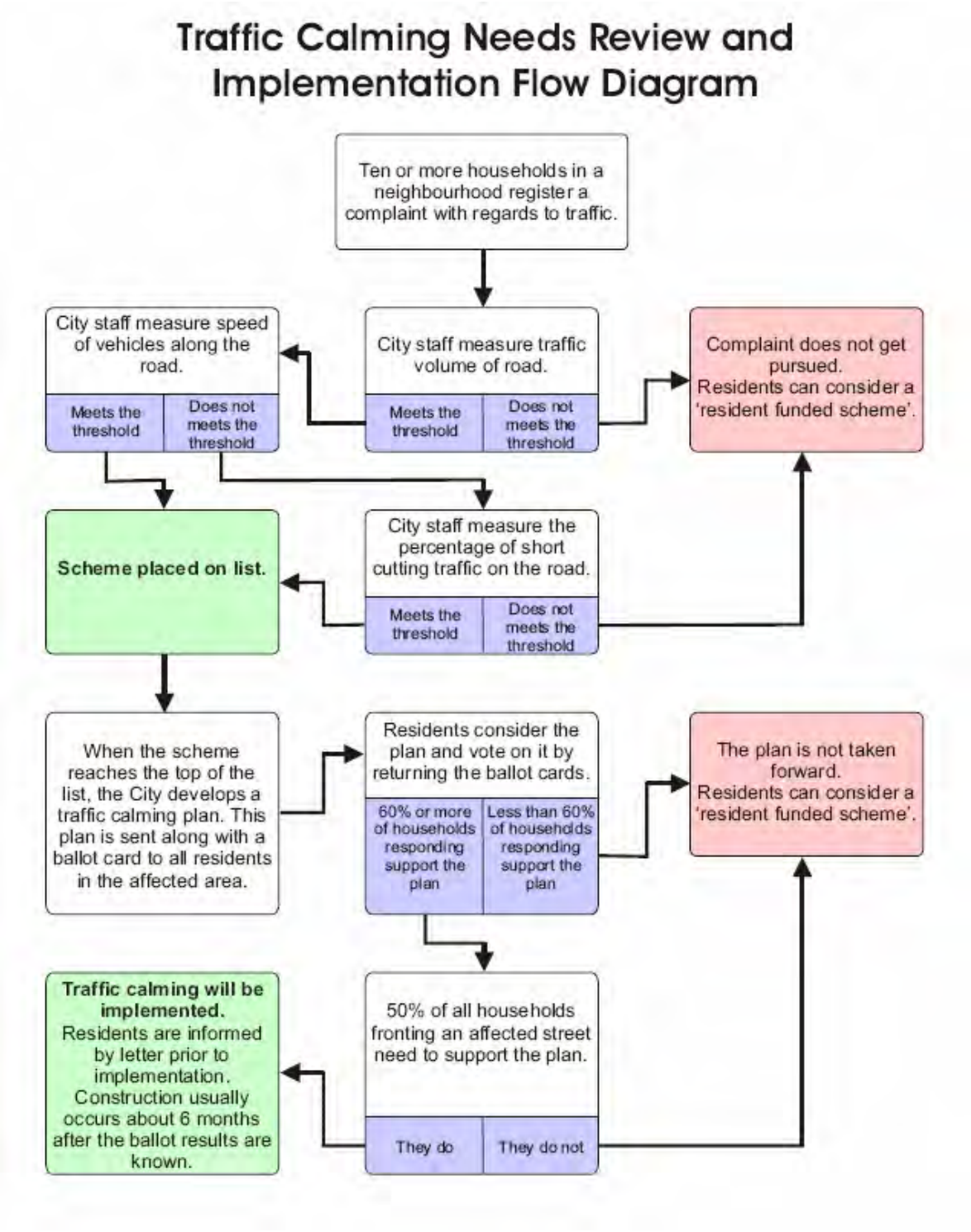


Exhibit 3: City of Surrey Needs Review Work Flow

The residents themselves are responsible for collecting the required funds for the project. However, there is no resident cost-sharing formula, and individual residents can choose to contribute nothing, or any amount that they see fit.

Corporation of Delta Traffic Calming Warrant

Type of Policy	Reactive Localized Program
Warrant Type	Quantitative Thresholds

Locations for potential traffic calming in the Corporation of Delta are identified by staff or through resident requests, and the requests are first screened, then prioritized. Sites are screened using a point score system (7). Sites require more than 25 points obtained from the sum of: (a) 5 points for every 5km/h that the measured 85%ile speed is above the posted speed limit to a maximum of 25 points; and (b) 1 point for every 100 vehicles per day to a maximum of 25 points.

After meeting this criteria, a survey is sent to residents in the study area. At least 50% of surveys must be returned and at least 50% approval must be met in order to be approved. Priority is then assessed based on:

- Safety performance (crashes, crashes involving speed, perceived risk and exposure);
- Traffic characteristics (traffic volume, through traffic, pedestrian/cyclist volumes);
- Physical characteristics (road width, grade, alignment, parking, etc)
- Environment (traffic noise, land use, number of residents affected, etc)

The Corporation of Delta Neighbourhood Traffic Calming Policy (7) identifies a number of different funding alternatives for traffic calming projects including:

1. Direct funding from the Corporation of Delta: the project must meet one of the traffic infiltration, excessive travel speed, or traffic volume criteria.

2. Specified Area Petition Plan: resident-funded through a 15-year amortized cost added to the property taxes of benefiting properties, similar to a Local Improvement Program (LIP). This measure requires a two-thirds majority approval of property owners representing more than one-half of the assessed land value.
3. Specified Area Initiative Plan: Council votes on a bylaw to establish an annual specified area tax on properties benefited by traffic calming. If more than 50% of property owners in the area object, the bylaw is defeated.
4. Other sources: the ICBC Road Improvement Program provides partial funding for projects that result in a significant safety benefit, subject to a favourable benefit-cost analysis. Other funding sources are also available.

City of Portland Traffic Calming Warrant

Type of Policy Reactive Localized Program
Warrant Type Quantitative Thresholds

The City of Portland (9) identifies study sites through citizen requests. If the problem is related to speed, these requests are first referred to the Police Bureau's Traffic Division for speed enforcement. If this is not effective, it is directed back to the Traffic Engineering Department for further evaluation. Under this evaluation a qualification score is calculated that requires more than 40 points obtained from the sum of:

A. 5 points for every mph that the measured 85%-tile speed is more than 5mph above the posted speed limit to a maximum of 50 points; and
B. 1 point for every 100 vehicles per day to a maximum of 50 points.

Sites meeting this criteria are then advanced to the selection scoring procedure that considers speed, volume, schools, pedestrian generators, pedestrian routes, bicycle routes, transit streets, and pedestrian facilities. The selection score is calculated from the sum of:

A. 1 point for every 1 percentage of vehicles traveling 10mph over the posted speed limit to a maximum of 50 points;
B. 1 point for every 1,000 vehicles over 5,000 veh/day to a maximum of 5 points;
C. 5 points for each 20-mph school zone on the project street to a maximum of 10 points;
D. 5 points for each public facility that generates a significant number of pedestrians on the street to a maximum of 15 points; and
E. 5 points if the street is a designated pedestrian route.

The qualification and selection scores are added together, and the combined score is used to rank the sites in relation to each other.

A survey is then sent to residents in the study areas with the highest rankings. At least 30% of surveys must be returned and at least 50% approval must be met in order to meet approval.

The City of Portland also includes an evaluation procedure 6 months after construction of the project to evaluate the effects of the traffic calming implementation, both on the subject street and in terms of diverted traffic, etc.

City of Port Moody

Type of Policy	Reactive Localized Program
Warrant Type	Quantitative Thresholds

The City of Port Moody (11) follows a similar approach to City of Portland in assigning a points score as a primary evaluation measure, which determines sites that should advance to the next stage of evaluation. The second stage of the evaluation scores from consideration of school zones, pedestrian oriented areas, bicycle routes, and transit routes. This is then combined with the primary score to rank the locations to be studied for traffic calming. Details of this process are included in **Table 3** below.

Table 3 City of Port Moody Traffic Calming Evaluation (11)

POINT ASSIGNMENT			
Criteria		Local Residential	Neighbourhood Collector Residential
A) PRIMARY SCORING			
1	Traffic Volume	Average daily traffic (ADT) divided by 100 max. 25 points	Average daily traffic (ADT) divided by 300 max. 25 points
2	Speed	5 points for every km/h of the operating speed (85th percentile speed) beyond 5 km/h above the posted limit. max. 25 points	5 points for every km/h of the operating speed (85th percentile speed) beyond 5 km/h above the posted limit. max. 25 points
Total Score (A) (1+2) (max 50 points)		Traffic calming requests with a total PRIMARY scoring of less than 25 points are not technically justifiable.	
B) SECONDARY SCORING			
3	School Zone	+5 points per school zone	+5 points per school zone
4	Pedestrian-Oriented Areas	+5 points per pedestrian oriented facility (i.e. senior housing or park)	+5 points per pedestrian oriented facility (i.e. senior housing or park)
5	Bicycle Route	+5 points for a subject street designated as a bicycle route	+5 points for a subject street designated as a bicycle route
6	Transit Route	-5 points for a subject street designated as a transit route	-5 points for a subject street designated as a transit route
Total Score (B) (3+4+5+6)			
Combined Total Score (A & B)		The combined total scores are assigned to NTCP requests and ranked for budget considerations.	

District of Saanich Traffic Calming Warrants

Type of Policy Reactive Localized and Reactive Areawide Programs

Warrant Type Points Score

The District of Saanich has two sets of warrants, one for local traffic calming applications and one for area-wide traffic calming (12) as shown in **Tables 4 and 5**. The overall process for evaluating for traffic calming projects is initiated through the filing of an application form followed by a points score evaluation conducted by District staff.

Table 4 District of Saanich Local Treatment Criteria

Criteria	Points	BASIS FOR POINT ASSIGNMENT
Speed	0 to 50	85 percentile speed of traffic. 1 point will be allocated for every kph the 85 percentile speed is over stated speed limit, based on speed reader board information supplied by applicant)
Volume	0 to 50	Average daily traffic volumes (1 point assigned for every 100 vehicles, based on traffic count done whilst using speed reader board)
Education	10	Motorist education program used to no avail.
Enforcement	10	Enforcement program used to no avail.
Total Points Possible	120	

Table 5: District of Saanich Area-Wide Treatment Criteria

Criteria	Points	Basis For Point Assignment
Speed	0 to 50	85 percentile speed of traffic. 5 points will be allocated for every kph the 85 percentile speed is over stated speed limit
Volume	0 to 50	Average daily traffic volumes (1 point assigned for every 100 vehicles
Vehicle Collisions	0 to 25	Average number of vehicle collisions over the last 3 years, based on police reports. Five points will be allocated for every collision in an average year.
Elementary Schools	0 to 10	5 points assigned for each school zone in the street
Pedestrian Generators	0 to 15	5 points assigned for each public facility (such as parks, community centres, and high schools) that generates a significant number of pedestrians on the street
Safe Route to School	0 to 5	5 points assigned for a safe route to school on the street
Bicycle Routes	0 to 5	5 points assigned if the street is a designated bicycle route
Transit Streets	0 to 5	5 points assigned if the street is a designated transit route
Pedestrian Facilities	0 to 5	5 points assigned if there is no continuous sidewalk on at least one side of the street.
Total Possible Points	170	

City of Toronto Traffic Calming Warrant

Type of Policy Reactive Localized Program

Warrant Type Quantitative Thresholds

City of Toronto (10) considers traffic calming only on local and collector classification roads. Three traffic calming warrants need to be met to be recommended for approval.

Warrant 1 - Petition:

This ensures that there is a basic level of public support and requires consideration be initiated following a public meeting, upon receipt of a petition signed by at least 25% of affected households, or by a survey conducted by the Ward Councillor. Upon meeting this warrant, District staff review the potential impacts to neighboring streets, e.g. diverted traffic.

Warrant 2 - Safety Requirements:

1. Pedestrian safety: continuous sidewalks need to be provided on at least one side of the street before other traffic calming measures will be considered;
2. Road grades: traffic calming is applicable for grades less than 5% and may be considered for grades between 5 – 8%;
3. Emergency services will not be significantly impacted by traffic calming. This is conducted through consultation with emergency services providers.

Warrant 3 – Technical Requirements:

1. Speed and volume: traffic calming is considered if the 85th %-tile speed is more than 15km/h greater than the posted speed limit or if the 85th %ile speed is 10 – 15 km/h greater than the posted speed limit and daily traffic volumes are in excess of 1,000 vpd for local streets and 2,500 vpd for collector streets;

2. Daily traffic volumes: for local streets in excess of 1,000 vpd and for collector streets in excess of 2,500 vpd;
3. Block length, i.e. the distance between the centre of controlled intersections (traffic signal or stop control) must be greater than 120m to consider mid-block traffic calming;
4. Transit must not be significantly impacted.

If all warrant criteria are met, then the application is recommended pending the results of a poll of affected residents. The poll is distributed amongst residents either fronting or flanking the proposed project and a response rate of at least 50% and an approval rating of at least 60% has to be met.

A points system is used to rank the identified projects as shown on **Exhibit 4**. The criteria includes speed, volume, collisions, pedestrian, and bicycling factors.

Ranking Max.100 points	**Speed** (0 to 25 points)	**Local Road** 2 points for each km/h that the 85th%ile speed is above the Minimum Speed threshold used in Warrant 3.1 of Traffic Calming Policy	**Collector Road** 1 point for each km/h that the 85th %ile speed is above the Minimum Speed threshold used in Warrant 3.1 of Traffic Calming Policy
	Volume (0 to 25 points)	**Local Road** 1 point for every 100 vehicles of daily traffic (0-2500 vehicles per day)	**Collector Road** 1 point for every 220 vehicles of daily traffic over 2500 (2500-8000 vehicles per day)
	Collisions (0 to 25 points)	5 points for 1 preventable collisions[1] recorded by police in the past 3 years; or 10 points for 2 or more preventable collisions[1] recorded in the past 3 years; or 10 points for 1 or more preventable collisions[1] recorded resulting in personal injury in the past 3 years.	
	Pedestrian and Bicycling Factors (0 to 25 points)	5 points for each pedestrian generator (e.g. Park, school, seniors centre, recreation centre, church, or other public institution, etc.) 10 points for a signed bicycle route[2]	

Notes: The review should generally be conducted from one intersecting collector street (or minor or major arterial street) to another
Road classifications are as determined in the City's Road Classification System
[1]Preventable collisions are those that are considered preventable through the use of traffic calming measures
[2]Signed bicycle route means a bicycle route identified in the City's Master Cycling Plan

Exhibit 4: City of Toronto Traffic Calming Ranking Criteria

The general process in assessing traffic calming projects in the City of Toronto is included on **Exhibit 5**.

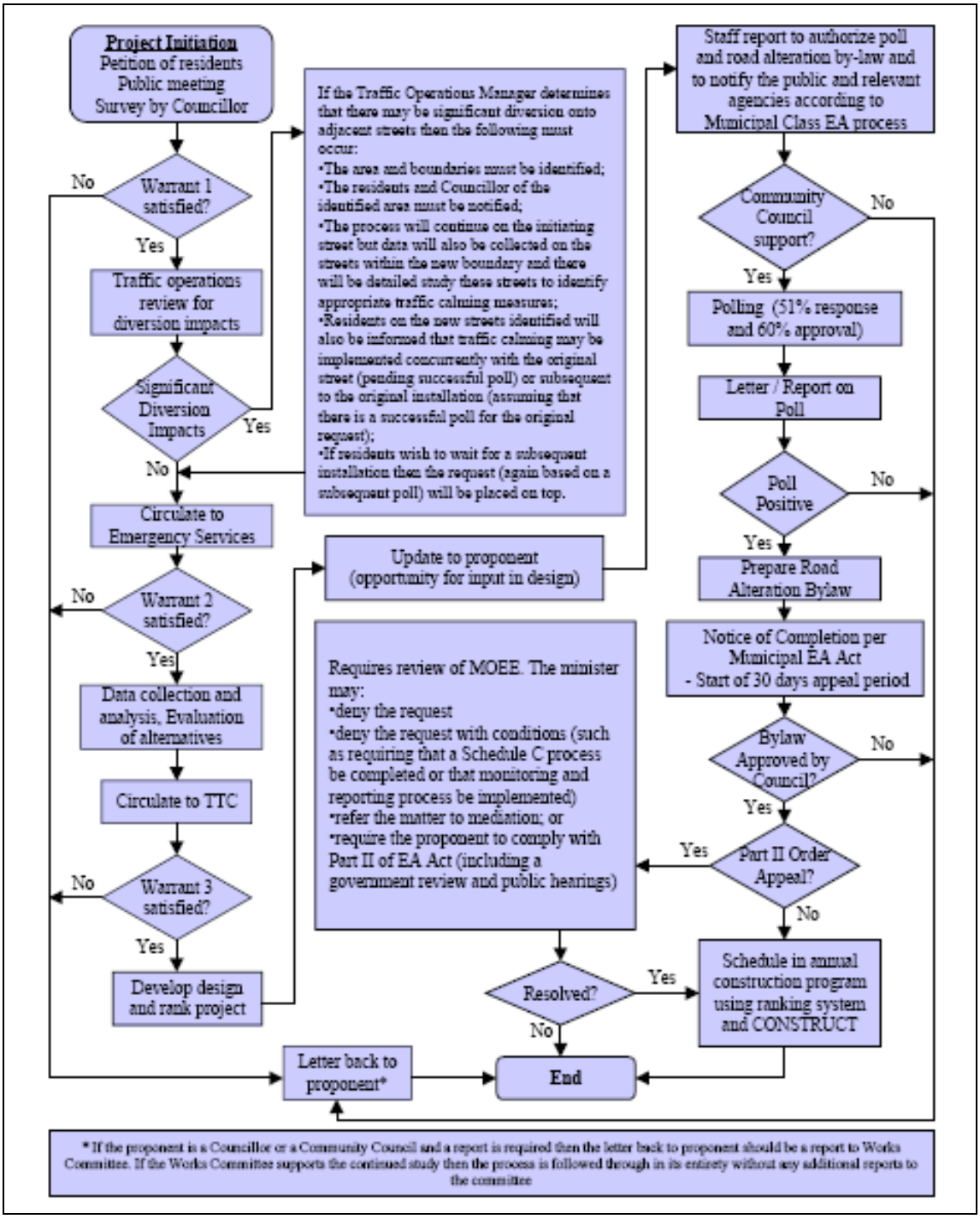


Exhibit 5: City of Toronto Traffic Calming Evaluation Procedure (10)

Australian Examples

Canberra, ACT

The City of Canberra also adopts a points score system to evaluate locations warranted for traffic calming (2), however points are offered on a more graduated scale and in a significant number of criteria as shown on **Exhibit 6**. In this way, these warrants are more comprehensive, however some practitioners are concerned about the warrants identifying too many sites with such an extensive criteria that can not be met by available funding. To overcome problems, some agencies with similar warrants do not guarantee traffic calming will be implemented even with the meeting of the warrants and/or they allow applications received after another to 'leapfrog' the priority list, depending on their overall ranking rather than being based on the time received.

Brisbane, QLD

The Brisbane City Council was one such agency that investigated the use of a points score system, however it was found that the selected criteria resulted in an unmanageable number of projects warranting traffic calming which were beyond available funding. To keep up with the demand for requests, an holistic crash warrant was developed (2) that required a minimum of 350 crashes per 100 million veh-kms as well as 60% resident support. The areas meeting this criteria were then ranked based on traffic speeds, volumes, and truck movements.

Traffic Parameter	Value	Points per 500m of street or road		
		Local Street	Collector Street[1]	Distributor Road[1]
Traffic Speed 85th Percentile Speed	>55 >60 >65 >70 >75	1 3 5 8 11	0 1 3 6 9	0 0 2 6 9
Traffic Volume 24 Hour Volume	>1000 >1500 >2000 >3000 >5000 6000+	2 3 4 7 10 13+3 per 1000	1 2 3 5 8 11+3 per 1000	0 0 0 2 4 7+3 per 1000
Traffic Volume Highest Hourly Volume (HHV)	>150 >200 >300 >400 >600 700+	1 2 3 4 6 8+2 per 100	0 1 2 3 5 8+2 per 100	0 0 1 2 4 8+2 per 100
Through Traffic Peak hour volume - % of 24 hour volume	>10% >20% >30% >50%	1 2 3 5	0 1 2 4	0 0 1 2
Crash data (5 year period) Per fatal crash Per serious injury crash Per other-injury crash	Points per crash	6 4 2	5 4 2	5 4 2
Noise	> 58 $dBAL_{18h}$ > 63 $dBAL_{18h}$ > 68 $dBAL_{18h}$	5 10 15	5 10 15	3 7 12
Heavy Vehicles	Points per % of total traffic	2	2	2
Activity Generators	Low Medium High Primary School Secondary School	1 3 5 10 10	1 3 5 15 15	1 3 5 20 15

Notes: 1 - subtract 2 points from all speed and volume scores if nature strip width > 8 m.

Table 4 : Recommended "Problem Warrants" for Canberra

Exhibit 6: City of Canberra Traffic Calming Points Score Table

6.0 Key Considerations

In considering the development of appropriate traffic calming warrants and policy, the Town of Gibsons should consider the following questions:

- Is the overall traffic calming program to be proactive or reactive, is it to be localized or areawide?
- What type of traffic calming warrant is desirable, e.g. general, points score, guidelines rather than warrant?
- What criteria should be used for the identification of traffic calming projects?
- What criteria should be used in rating/ranking traffic calming projects and should these be weighted?
- If quantitative, what thresholds should be developed to assess the chosen criteria?
- How will public opinion be gathered and assessed?
- How will traffic calming measures be funded?

****

Please feel free to contact myself or Jane Farquharson to discuss any part of this literature review. Upon your review we look forward to developing an appropriate traffic calming warrant for the Town of Gibsons.

Yours truly,

BUNT & ASSOCIATES

Adrian Witte, M.Sc.
Transportation Planner

References

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11. City of Port Moody. *Neighbourhood Traffic Calming Policy.* Engineering and Operations. June 26, 2001.

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Appendix F

Example Petition

TOWN OF GIBSONS
EXAMPLE PETITION

TRAFFIC CALMING PETITION

Street: _____

Between: _____ and _____

Reason(s) for Traffic Calming Review: _____

_____

_____

_____

#	Signature	Name	Address
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Appendix G

Evaluation Mail-Out Letter

TOWN OF GIBSONS
EVALUATION LETTER

Address
Address
Address

Dear Resident,

The Town of Gibsons recently <received a petition of signatures from local residents/ received direction from Council> that identified <insert street name> between <insert location from> and <insert location to> as a site to review for traffic calming.

Sites identified for traffic calming are assessed under the Town of Gibsons Traffic Calming Policy. Details on the assessment process can be found on the Town's website at: <insert website address>. Your household has been identified as being impacted by this project and as part of the evaluation process, Town staff wishes to guage resident support of traffic calming on the above listed street.

Please complete the attached survey and return by <insert date>. Alternatively, surveys can be returned via mail, fax, or email to:

<Insert Town contact>
<insert address>
<insert fax number>
<insert email address>

Results of the survey will be mailed to residents and posted on the Town's website by <insert date> along with the next steps of the assessment process.

Your input is valuable to us, please take this opportunity to have your say in our community.

Regards,

<insert name>
<insert position>

Appendix H

Example Questionnaire

TOWN OF GIBSONS
TRAFFIC CALMING QUESTIONNAIRE

Please fill out the questionnaire below as completely as possible (one per household). All questions are optional. Please return this survey before Tuesday 30th October using the postage paid envelope or addressed to:

<insert name>
Town of Gibsons
<insert address>
<insert address>
Fax: <insert fax number>
Email: <insert email address>

BACKGROUND INFORMATION	
Name	
Address	

EXISTING SITUATION			
Please rate the importance of each of the following existing traffic issues along the study street. *Please rate each response from 1 (low priority) to 5 (high priority)*			
<Issue>		<Issue>	
Other Issue:		Other Issue:	
Please respond to the following questions by ticking the appropriate box.			
Do you support the Town of Gibsons undertaking a review for the implementation of traffic calming on <insert street name>	☐ Yes	☐ No	

TRAFFIC CALMING MEASURES			
Please rate each of the traffic calming measures below from 1 (low) to 5 (high) depending on how effective you believe each one would be in solving the issues identified above.			
<treatment>		<treatment>	
<treatment>		<treatment>	
Others:		Others:	

Do you have any additional comments that will assist staff? *(add pages as necessary)*

_____

_____