

*RESORT
MUNICIPALITY
OF WHISTLER*

Traffic Calming Policy

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**Traffic
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1. INTRODUCTION

This document presents a recommended Traffic Calming Policy for the Resort Municipality of Whistler. The policy provides guidance regarding a process for developing and implementing traffic calming measures — on a community-wide basis and on a localized basis. The policy also contains technical information regarding the selection, design and construction of traffic calming devices.

1.1 Why A Program Is Needed

The safety of road users is an important priority in Whistler — particularly the safety of pedestrians and cyclists, who are the most vulnerable road users. The municipality wishes to maintain and enhance safety for road users as Whistler grows and as numbers of visitors increase. Areas where safety is a particularly important consideration include:

- Locations where the Valley Trail crosses roadways, particularly at mid-block locations.
- Pedestrian safety at high-use crossings, including pedestrian crossings on routes to school, adjacent playgrounds, and in the Village Centre.
- School zones, playground zones and other areas with reduced speed limits, where compliance with these speed limits may be an issue.
- Local residential streets where speeding may be a concern. Generally, these problems are limited to a few isolated locations, where the road geometry is conducive to speeding, or where the road geometry may be considered inadequate for the posted speed.

Many municipalities have responded to these concerns by implementing traffic calming measures — speed humps, traffic circles, curb extensions, diverters and a range of other measures intended to slow, discourage or obstruct unwanted traffic. Although most municipalities have been successful with traffic calming efforts, some municipalities have created more problems than they have solved. Typically, this has happened when traffic calming measures have been applied in a piecemeal manner, without an overall plan and without consideration of the implications of traffic calming.

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Some traffic calming measures have already been implemented in Whistler, and the municipality wishes to consider additional traffic calming measures as a means of maintaining and improving safety for road users. To avoid problems which other municipalities have experienced with traffic calming, staff in Whistler have developed this Traffic Calming Policy. The intent of the policy is to proactively address traffic and safety issues, to respond to localized problems and concerns, to ensure that funds spent on traffic calming are spent cost-effectively, that reported problems are resolved, and that no new problems are created in the process.

1.2 Traffic Calming Resources

Whistler's Traffic Calming Policy was developed based on a review of traffic calming policies and programs in the following B.C. communities and U.S. communities:

- Vancouver
- North Vancouver City
- North Vancouver District
- Delta
- Coquitlam
- Saanich
- Kelowna
- Seattle, WA
- Bellevue, WA
- Portland, OR
- Berkeley, CA
- Ventura, CA
- Boulder, CO
- Fairfax, VA

The Traffic Calming Policy is intended to supplement the information contained in the *Canadian Guide to Neighbourhood Traffic Calming*, which was published in December 1998. The Guide was prepared for the Transportation Association of Canada and the Canadian Institute of Transportation Engineers, and provides consistent guidelines for the implementation of traffic calming measures throughout Canada.

Rather than replicate the information contained in the Guide, the Traffic Calming Policy provides additional information specific to conditions in Whistler, such as goals for traffic calming, the applicability of various traffic calming devices to conditions in Whistler, approaches to implementing traffic calming measures, and means of soliciting community input regarding traffic calming. The Traffic Calming Policy also updates design information contained in the Guide.

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2. GOALS

This section describes goals for traffic calming in Whistler, and describes means of achieving these goals with specific objectives. These goals and objectives provide the basis for other components of the Traffic Calming Policy, described in subsequent sections.

Residents and other community members wish to achieve two key goals in undertaking neighbourhood traffic calming in Whistler:

- **Safety.** Traffic calming can make streets safe for everyone, including all road users — pedestrians, cyclists, motorists and others. Many conflicts are the result of excessive speeds and motorist inattention — the very problems that traffic calming can correct. Research has shown that specific traffic calming devices can reduce collision rates by as much as 90%.
- **Livability.** Traffic calming can help to preserve and enhance the livability of the community by minimizing the negative impacts of traffic — noise, pollution and visual intrusion. Attractively designed and landscaped traffic calming devices can also enhance the streetscape, enhancing livability as a result.

It is intended that these goals be pursued in a manner which is consistent with Whistler's Comprehensive Transportation Strategy. This means that traffic calming measures would be applied to improve safety and livability, while maintaining the effectiveness of the road network — particularly arterial and collector roads — for transporting people and goods.

Objectives to achieve the goals of improving safety and livability include:

- **Minimize conflicts.** Reducing conflicts between road users reduces the likelihood of a collision occurring, thereby improving safety, particularly for pedestrians, cyclists and other vulnerable road users.
- **Reduce vehicle speeds.** Speeds which are suitable for one type of road — a major arterial road, for example — may be considered excessive on a residential collector road or local street. Measures

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which reduce vehicle speeds help to reduce the likelihood of a collision occurring, and the severity of a collision. Reducing vehicle speeds also helps to improve the livability of a community by reducing noise and other negative impacts of traffic.

- **Discourage through traffic** on local residential streets. These streets are primarily intended for access to properties, not for accommodating through traffic. Reducing through traffic helps to improve safety by reducing the potential for conflicts, and it helps to improve livability by reducing noise and other negative impacts of traffic.
- **Establish an on-going process to address problems.** New roads, additional development and other changes may result in changes in traffic patterns, and may create new traffic problems in the future. Establishing municipal policies and procedures to monitor and review conditions will help to ensure that problems are corrected when they occur. Establishing proactive policies to consider traffic calming in the design of new roads and neighbourhoods will help to ensure that problems are avoided in the first place.
- **Allocate funds cost-effectively.** Ensuring that the costs of traffic calming are minimized and that the most cost-effective solutions are implemented will mean that traffic calming initiatives can be pursued as quickly as possible throughout the community, and that other transportation improvements will not be unnecessarily deferred as a result of traffic calming plans.

3. APPLICABILITY

This section identifies which traffic calming measures are appropriate for use in Whistler, and identifies which ones should not be used. Information regarding the applicability of traffic calming measures is also provided to supplement existing published information.

The *Canadian Guide to Neighbourhood Traffic Calming* identifies a total of 25 measures which are used in Canada for traffic calming, as listed in **Table 3.1**. However, the Guide notes that not all of these 25 measures are appropriate as traffic calming measures. Some measures — such as stop signs, maximum speed signs and rumble strips, for example — should not be used for traffic calming. Although effective for other purposes, these measures have proven to be ineffective for traffic calming purposes.

Recommended Traffic Calming Measures

The traffic calming measures identified below are recommended for use in Whistler. Some traffic calming measures can be used on all roads, whereas others should be used only on specific classifications of roads. In Whistler, roads are classified according to four categories — local residential, collector residential, collector industrial and arterial. Examples of arterial roads include major roads such as Blackcomb Way, Village Gate Boulevard and the section of Lorimer Road within the Village. Examples of collector residential roads include roads which provide access to residential neighbourhoods, such as Alpine Way, Nordic Drive and the section of Lorimer Road to the west of the Village.

Other factors affecting the applicability of traffic calming measures include access for emergency vehicles, and transit service. It should be noted that snow clearing is generally not an issue with the recommended traffic calming measures, provided that they are designed in accordance with the guidelines in the *Canadian Guide to Neighbourhood Traffic Calming* and the guidelines presented in Section 7, and are signed or otherwise marked so as to be visible to snow plow operators. Potential implications for emergency vehicles and transit buses are identified where applicable.

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Table 3.1
Applicability of Traffic Calming Measures
(✓'s indicate conditions in which a measure is applicable for traffic calming)

	Road Classification				Other	
	LR	CR	CI	A	ERR	TR
Vertical Deflection						
• Raised crosswalk	✓	✓	✓			✓
• Raised intersection						
• Rumble strip						
• Sidewalk extension	✓				✓	✓
• Speed hump	✓	✓	✓		✓	✓
• Textured crosswalk	✓	✓	✓	✓	✓	✓
Horizontal Deflection						
• 1-lane chicane	✓				✓	
• 2-lane chicane						
• Curb extension	✓	✓	✓	✓	✓	✓
• Curb radius reduction	✓	✓		✓	✓	✓
• On-street parking	✓	✓		✓	✓	✓
• Raised median island	✓	✓	✓	✓	✓	✓
• Traffic circle	✓				✓	
Obstruction						
• Directional closure	✓				✓	✓
• Diverter	✓					
• Full closure						
• Intersection channelization	✓	✓	✓	✓	✓	✓
• Raised median through intersection	✓	✓	✓	✓	✓	✓
• Right-in/right-out island	✓				✓	
Signage						
• Maximum speed						
• One way						
• Stop						
• Through traffic prohibited						
• Traffic-calmed neighbourhood	✓	✓	✓	✓	✓	✓
• Turn prohibited		✓	✓	✓	✓	✓
• Yield						
LR = Local Residential				ERR = Primary Emergency Response Route		
CR = Collector Residential				TR = Transit Route		
CI = Collector Industrial						
A = Arterial						

- **Raised crosswalks.** A raised crosswalk is essentially a speed hump combined with a crosswalk. It provides the same benefits as a speed hump in slowing vehicles at the crossing. It also improves pedestrian safety by increasing the visibility of the crosswalk, and conveying a message to motorists that pedestrians have priority at the crossing.

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- **Speed humps.** Several speed humps have been installed on local residential streets in Whistler, and have proven effective in discouraging speeding. At speeds under 50 km/h, a speed hump gently rocks a vehicle as it travels over the hump. At speeds over 50 km/h, a speed hump causes a more abrupt jolt to the vehicle. Consequently, most motorists drive over speed humps at approximately 40 km/h. Where speed humps are spaced every 100 m to 125 m apart, vehicle speeds between humps remain at 50 km/h or less.
- **Raised crosswalks and speed humps** should not be used on arterial roads as they can create excessive delays and congestion due to the higher traffic volumes on arterial roads, and as a result could create a safety concern. Raised crosswalks and speed humps should not be used on primary emergency response routes as they delay fire vehicles and ambulances approximately 5 seconds per crosswalk. As well, raised crosswalks and speed humps should not be used on grades of more than 8%.

Speed humps and raised crosswalks can be used on transit routes. The *Canadian Guide to Neighbourhood Traffic Calming* recommends a 7.0 m long “collector” speed hump be used on transit routes, but recommends that they not be used where articulated buses operate. Experience in Vancouver BC, Portland OR and other cities indicates that both recommendations are unnecessary. In these cities, 4.0 m “standard” speed humps are used on transit routes with no reported problems, even with articulated buses. It is important to note, however, that 4.0 m “standard” humps should only be used on local residential streets.

- **Sidewalk extensions** are intended for use on local residential streets and are not appropriate for collector and arterial roads. The primary purpose of a sidewalk extension is to indicate that traffic on the approach with the sidewalk extension yield to traffic on the intersecting road. Because there are few sidewalks in residential areas, the applicability of sidewalk extensions in Whistler is limited.
- **Textured crosswalks** are appropriate for use on all roads. The effectiveness of a textured crosswalk is minimal unless combined with other crossing enhancements, such as a raised crosswalks and/or curb extensions.

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- **Curb extensions** improve pedestrian safety by reducing the distance that pedestrians must cross a roadway, as well as improving the visibility of pedestrians for approaching motorists, and the visibility of approaching vehicles for pedestrians. Curb extensions can be used at intersections and in mid-block locations, and can be used alone or in combination with a raised crosswalk and/or a median island.
- **Traffic circles** should only be used at intersections of local residential streets. They should not be used on collector residential, collector industrial or arterial roads, even where these roads intersect local residential streets. Experience in other communities has shown that where traffic circles are located on major roads such as collector and arterial roads, traffic entering the traffic circle from the major road often fails to yield to traffic which has already entered from the local street, creating a safety concern.
- **Median islands** are installed in the centre of an arterial or collector road, in order to slow traffic without affecting the capacity of the road. Median islands are particularly useful at unsignalized crosswalks on higher-volume roads, as they increase motorists' awareness of the crosswalk and permit pedestrians to cross half the road at a time. Median islands can be combined with curb extensions and/or raised crosswalks to further improve pedestrian safety.
- **One-lane chicanes** should only be used on local residential streets. They are not appropriate for use on collector and arterial roads, as they reduce traffic flow to a single lane. For this reason, they are also not appropriate for use on transit routes. One-lane chicanes can be used on primary emergency response routes, as vehicles will generally exit the chicane before pulling to the side of the road and stopping for on-coming emergency vehicles.
- **Obstructions** such as directional closures, diverters and right-in/right-out islands should not be used on collector or arterial roads, and should be used on local residential streets only where vertical and horizontal deflection measures would not be effective nor appropriate.

Traffic Calming Measures Not Recommended

The following traffic calming devices are not recommended for use in Whistler:

- **Raised intersections** are not readily visible to motorists and other roadway users. Consequently, their effect on vehicle speeds and traffic volumes are minor, at best. Given the high cost of retrofitting raised intersections on existing roadways, it is recommended that raised intersections not be used in Whistler as a traffic calming measure.
- **Rumble strips** are effective when used to alert motorists to the presence of a stop sign, crosswalk, reduced speed zone or potentially hazardous situation. Experience has shown that rumble strips have no effect on vehicle speeds or volumes, and the noise and vibration created by rumble strips is significant. Consequently, rumble strips should not be used as a traffic calming measure.
- **Two-lane chicanes** have not proven to be effective in reducing vehicle volumes, and have only minor effects on vehicle speeds. These negligible benefits are offset by potential unsafe situations created when some motorists cross the centreline of the roadway in order to minimize horizontal deflection. Consequently, two-lane chicanes should not be used as a traffic calming measure. As noted above, one-lane chicanes are appropriate on local residential streets.
- **Full closures** should be considered only as a last resort, as they severely restrict access for residents and others travelling to and from locations within a neighbourhood. Less restrictive measures should be considered first, as in most cases these can achieve the same results, without the severe impacts associated with a full closure. If a full closure is to be implemented, through access should be maintained for emergency vehicles, pedestrians, bicycles and transit vehicles (if located on a transit route).
- **Signage** prohibiting turns and through movements should only be used as an alternative in situations where appropriate traffic calming measures cannot be used. The use of signage without accompanying physical traffic calming devices should be avoided where possible, as this can create an enforcement problem, and as a result can be costly in terms of police resources.

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- **Signage** intended for traffic control purposes should not be used as a traffic calming measure. The unwarranted use of Stop, Yield and Maximum Speed signs has been shown to have little effect on vehicles speeds and volumes, and results in increased non-compliance with traffic regulations. Not only is the original problem not addressed, but a new enforcement problem is also created. Consequently, it is recommended that Stop, Yield and Maximum Speed signs not be used in the municipality as traffic calming measures. Existing installations of unwarranted signs should be evaluated to identify traffic calming measures which could be used as alternatives.

4. COMMUNITY-WIDE TRAFFIC CALMING

In most municipalities, traffic calming measures are implemented on a reactive basis, in response to identified traffic and safety problems. Although this is an effective approach, it does not capitalize on the full potential of traffic calming measures to improve safety throughout the community. Consequently, in Whistler it is recommended that in addition to implementing traffic calming measures on a localized basis (as described in Section 5), traffic calming measures also be implemented on a proactive basis throughout the community. This section describes a comprehensive approach to traffic calming throughout the municipality.

4.1 Pedestrian Safety

Pedestrians are the most vulnerable road users. In areas of high pedestrian activity, and in areas with a high number of child pedestrians (such as schools and playgrounds), it is desirable to implement additional measures to enhance pedestrian safety, minimize the potential for conflicts between motor vehicles and pedestrians, and reduce the potential severity of a collision with a pedestrian.

This section identifies several traffic calming measures which have been shown to improve pedestrian safety, and locations throughout Whistler where these could be implemented. It is recommended that the municipality undertake a program to implement these traffic calming measures over a period of five years, or as funding permits.

It should be noted that these traffic calming measures will not only benefit pedestrians, but will improve safety for other road users as well. Cyclists, in-line skaters and motorists will all benefit from a reduced potential for collisions and reduced potential severity of collisions.

- **Raised crosswalks.** As described in Section 3, raised crosswalks slow vehicles at pedestrian crosswalks, and increase crosswalk visibility. To enhance pedestrian safety, the municipality should undertake a program to upgrade existing crosswalks to raised crosswalks at the following locations on local and collector roads:
 - Crosswalks adjacent schools and playgrounds.
 - Crosswalks in 30 km/h speed zones.

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- Valley Trail crossings.
- **Curb extensions** reduce the crossing distance for pedestrians, and improve the visibility for pedestrians and motorists. To enhance pedestrian safety, the municipality should undertake a program to retrofit curb extensions in the following locations, provided that the roadway incorporates curb and gutter rather than an open shoulder:
 - At high-use crossings on collector and arterial roads with on-street parking, particularly in commercial areas and adjacent recreation facilities.
 - On local residential streets and local collector streets, adjacent schools and playgrounds.
 - At mid-block Valley Trail crossings located on a horizontal curve, where the sight distance for motorists would be improved by a curb extension.
- **Median islands** improve pedestrian safety by increasing motorists' awareness of crosswalks and permitting pedestrians to cross half the road at a time. To enhance pedestrian safety, the municipality should undertake a program to install median islands at crossings on arterial and collector roads, where there is sufficient width to construct the median island within the existing roadway.

Implementation of traffic calming measures to enhance pedestrian safety will likely require several years due to funding considerations. In determining which measures to implement first, priority should be given to high-use crosswalks, to crosswalks used by significant numbers of children, and to crosswalks not controlled by stop signs.

4.2 Upgrade Existing Speed Humps

Several speed humps have been installed on local residential streets in Whistler over the past few years. Some of these existing speed humps do not conform with the design guidelines describes in the *Canadian Guide to Neighbourhood Traffic Calming*. The humps are shorter than the 4.0 m length indicated in the Guide, and incorporate a circular profile rather than the sinusoidal profile described in the Guide.

In some cases, motorists must slow to 30 km/h to avoid being jolted by existing speed humps. While 30 km/hr is an acceptable speed in many areas, it may not be desirable to slow motorists this much in other areas,

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including collector streets. Humps which require motorists to slow excessively can also generate complaints regarding noise of braking and accelerating vehicles, may encourage motorists to drive around the humps on roads with open shoulders, and in extreme cases, have prompted motorists to honk their horns when crossing the hump.

Motorists should be able to drive over a speed hump at up to 40 km/h on collector streets. Motorists will generally accept being limited to this speed, and will not accelerate much above 45 km/h between speed humps (lower speeds can be achieved by spacing humps closer together). The speed hump design describes in the *Canadian Guide to Neighbourhood Traffic Calming* can be driven over at up to 40 km/h.

To address potential problems with some of the existing speed humps, the municipality should reconstruct the humps to the design in the *Canadian Guide to Neighbourhood Traffic Calming*. To minimize the municipality's cost, where possible reconstruction of these speed humps should be undertaken in conjunction with road reconstruction or repaving, or with implementation of other traffic calming measures in the area.

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5. LOCALIZED TRAFFIC CALMING

This section describes a process for implementing traffic calming measures to address localized problems with speeding vehicles, short-cutting traffic, pedestrian and cyclist safety, and impacts on neighbourhood livability.

The approach to localized traffic calming described in this section does not attempt to define “rules” for traffic calming by establishing “thresholds” for speeds, traffic volumes and other conditions. Some municipalities have followed this approach, establishing thresholds below which traffic conditions are not considered a problem and no action will be taken. The problem with this approach is that it is difficult to define thresholds that are applicable to all conditions within the community. Inevitably, a condition will arise which does not meet the specified threshold, but which is nevertheless a genuine problem, or at the least, is perceived by residents to be a genuine problem. In this case, the municipality has no means to respond, and might leave a safety problem unresolved. As well, the municipality risks creating a community relations problem by telling residents that in effect, “there is no problem” because the measured conditions did not meet a specified threshold.

Given the range of traffic conditions and expectations that can be encountered in Whistler, it is not advisable to define thresholds of traffic speed or volumes to govern the application of traffic calming solutions. Instead, it is best to define several “principles” of traffic calming which are relevant to all conditions, as described in this section. Conditions in which various traffic calming measures are applicable are described in Section 3.

5.1 Principles of Traffic Calming

There are several principles which should be applied in selecting and implementing traffic calming measures, as described below. Doing so will help to ensure that appropriate traffic calming measures are selected, that they are compatible with the community’s needs and objectives, and that potential negative effects of traffic calming are minimized.

- **Involve the community.** Residents, business operators and others who live and work in a community must have input to the

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identification of traffic problems and the selection of traffic calming measures. Involving the community builds support for traffic calming, and enhances the credibility of the resulting recommended measures. It also minimizes the potential influence of special interest groups who might otherwise unduly influence the outcome. If the community is not adequately involved, residents and others in a community might oppose the traffic calming measures — regardless of their technical merit — because they feel they were not properly consulted, that they were not listened to, or that the recommended measures do not recognize the unique circumstances of their neighbourhood.

- **Identify the real problem.** Frequently, the perceived nature of a traffic problem is substantially different from the real problem. In some cases, the difference is so great that a solution intended to eliminate the perceived problem might make the real problem worse. For example, residents often mention “traffic volume” and “speeding” as problems on their streets, but in many cases the problem is one or the other. It is important to identify the real problem, so as to select the appropriate measure. If the real problem is speeding, for example, a measure that significantly reduces the traffic volume on a street might inadvertently encourage speeding if fewer cars remain on the street to slow traffic.
- **Quantify the problem.** Some problems are more significant than other problems. Some problems are all-day problems, whereas other problems occur only at certain times, in certain seasons or in certain directions. Some reported problems are not really problems at all. In order to ensure that appropriate traffic calming measures are implemented, it is essential that the extent of problems is quantified. This means collecting data, including traffic volumes, accident data, counts of pedestrians and cyclists, measures of delay and other data as appropriate.
- **Use self-enforcing measures** — those that maintain a 24-hour presence, and do not require police enforcement to be effective. For example, traffic circles should be used instead of 4-way stops, speed humps should be used instead of speed restrictions, and directional closures and diverters should be used instead of turn prohibitions. Measures that can be circumvented — such as a turn prohibition or a directional closure — should be used only at intersections with major roads, where visibility and the presence of traffic discourage motorists from circumventing these measures.

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- **Minimize access restrictions.** Generally, residents and other members of the community will be more supportive of traffic calming measures that do not restrict their access into and out of a neighbourhood. Diverters, barriers and closures restrict access for people who live or work on a particular street, and support for such measures is directly related to the severity of traffic problems. Where problems can be addressed with other traffic calming measures that are not as restrictive to access, these should be considered instead, or residents should at least be given a choice of measures.
- **Consider effects on other streets.** In considering measures to resolve a traffic problem in one location, any potential effects on adjacent streets must be considered. These effects might be caused by traffic diverted to other streets, motorists who speed up further down a street from a traffic calming measure, or changes in turning movements which increase delays at intersection. If these effects are not considered in advance, a traffic calming measure might fail to solve a problem and at the same time create new problems or exacerbate existing problems elsewhere in the neighbourhood.
- **Target automobiles and trucks only.** The purpose in implementing traffic calming measures is to affect automobiles and trucks, not other modes. Consequently, traffic calming devices should be designed to permit transit buses, cyclists and pedestrians to pass through, while obstructing automobiles and trucks. Similarly, traffic calming devices should be located and designed so as not to impede emergency and service vehicles.

5.2 Process

This section describes the process of responding to complaints, verifying problems, and selecting and implementing localized traffic calming measures. These measures should be implemented to address problems including speeding vehicles, short-cutting traffic, pedestrian and cyclist safety, and impacts on neighbourhood livability.

1. **Identify problems.** Localized traffic calming is initiated in response to an identified problem. In most cases, these problems will be identified through requests and complaints from residents and other members of the community. In some cases, municipal staff, police

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and representatives of other agencies will identify localized problems which can potentially be resolved with traffic calming.

Regardless of how a problem is identified, it should be described in as much detail as possible. The nature of the problem should be specified, and characteristics such as direction of travel, time of day, day of the week, season and so forth should be identified where applicable. If necessary, observation should be undertaken to verify details of the reported problem.

- 2. Collect data.** To verify the nature and magnitude of a reported problem, data should be collected. These data include reported collisions, vehicle speeds, traffic volumes, pedestrian volumes and other data relevant to the reported problem. Where possible, traffic data should be collected using automatic counters, for a minimum of 168 hours (seven complete days), and should be collected during times when problems are reported to occur. Similarly, manual data collection efforts (such as traffic counts and licence plate traces) should be undertaken at times when problems are reported to occur.

Some of the required data will have been collected through the Engineering department's on-going transportation data collection program. This includes 24-hour traffic counts, manual intersection counts, pedestrian counts and accident reports. This information is available for many locations throughout the municipality. Additional information will need to be collected at locations for which municipal data are not available, or which are not typically part of the municipality's on-going data collection program (such as speed data and vehicle classification counts).

- 3. Community letter #1.** At this point, the municipality should solicit community input regarding the reported problems and the community's desire to pursue traffic calming solutions. A large proportion of property owners in Whistler are either absent much of the time or rent their properties. Consequently, the most effective means of soliciting community input would be with a letter to all residents and all non-resident property owners who would be directly affected by a traffic calming measure.

Letters should be sent to all residents and property owners who would use affected roadways to travel to and from their homes. Generally, this should include all residents and property owners on the affected roadways, as well as residents and property owners

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within the neighbourhood who would have no choice but to use the affected roadways.

The letter should explain that problems have been reported by residents or have been identified by municipal staff, and should describe the nature of the problems. Data should be summarized to indicate the extent of the problems, and any other relevant information should be included. Residents and property owners should be asked to provide additional information regarding the reported problems, as well as information regarding any other problems in the same location. The letter should conclude by asking residents and property owners whether or not they wish the municipality to investigate potential traffic calming solutions. Residents and property owners should be advised that if the municipality proceeds, they will receive another letter soliciting their input regarding potential traffic calming solutions.

Residents and property owners should be able to respond to the community letter in several ways — by Canada Post (pre-paid or business reply mail), by fax, by delivering a response to municipal hall, or by e-mail.

Support to proceed with a traffic calming solution should generally be measured based on greater than 50% of the homeowners in the neighborhood supporting the plan.

4. **Additional data collection**, if necessary.
5. **Identify applicable traffic calming measures**, and the benefits and impacts associated with each measure. Tables 3.2 and 3.3 in the *Canadian Guide to Neighbourhood Traffic Calming* provide a starting point in identifying potential measures to address specific problems. The information in Section 3 of this document regarding the applicability of traffic calming measures should also be used to eliminate measures as appropriate. All applicable measures should be considered in the next step, and the number of potential measures reduced as appropriate based on their effects on adjacent streets and interaction with other traffic calming measures.
6. **Develop potential traffic calming solutions**. This step involves reducing and combining the range of applicable traffic calming measures into one or two potential traffic calming “solutions” that represent the most effective means of addressing identified

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problems. In cases where two or more measures would address a problem, solutions should incorporate measures which would be the most effective, which could be combined with other measures to increase effectiveness, which would minimize access restrictions, and which would require the lowest cost to construct and maintain.

- 7. Community letter #2.** At this stage, a second letter should be sent to all residents and non-resident property owners within the same area as defined for the first community letter. The purpose of this letter is to present the traffic calming solution(s) and determine the level of support for these solution(s).

The proposed traffic calming solution(s) should be explained clearly, in non-technical language and with as much visual material as possible. The letter should include maps of the neighbourhood illustrating the locations where traffic calming measures would be installed. Background information should be included describing the nature of specific problems, such as observed vehicle speeds or numbers of collisions.

Respondents should be given three choices for each traffic calming solution. They should be asked to indicate whether they support the solution, do not support the solution or are neutral. The “neutral” choice is important. Some people might hesitate to actively support a traffic calming solution, but might not want to condemn it either with a vote of no support. A third option allows them to say, in effect, “I do not care strongly one way or another.” Without the “neutral” option, the number of persons who do not support a solution might appear to be significantly higher than the actual number, and might make it difficult to identify those who have legitimate concerns.

As with the first community letter, support to proceed with implementing a traffic calming solution should be measured based on greater than 50% support from homeowners in the neighborhood. If two solutions are presented and both receive the required level of support, then the solution with the higher level of support should be selected for implementation.

If the required level of support is not achieved, the municipality should consider whether changes to the proposed traffic calming solutions might generate sufficient support. If so, then a third community letter should be distributed describing the revised traffic calming solution(s). If not, or in the event that support is still not achieved after a third

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community letter has been distributed, then the municipality should not continue with efforts to develop a traffic calming solution for at least two years. If complaints persist after two years, then the municipality should repeat the entire process at that time.

8. **Refine traffic calming solution** as needed. Following the second community letter, minor refinements can be made to the selected traffic calming solution in order to address any outstanding issues. If major changes to the solution are required, a third community letter should be distributed describing the revised solution.
9. **Design.** To ensure that traffic calming measures are constructed properly, designs should be prepared for most devices based on accurate survey information. It is usually not necessary to prepare designs for individual speed humps and raised crosswalks — instead, a standard design can be used and a map prepared illustrating the exact location of speed humps and raised crosswalks. Designs should be based on information in the *Canadian Guide to Neighbourhood Traffic Calming*, and supplementary design information contained in Section 7.
10. **Construction.** Guidelines for the construction of traffic calming devices are included in Section 7. In some cases, it may be preferable to implement traffic calming devices on a temporary basis. After a period of six months to a year, if it has been determined that a device has achieved the intended results, it should then be constructed on a permanent basis. This avoids the risk of removing or modifying a permanent installation that was constructed at a much higher cost than a temporary installation. It also provides an opportunity to alter the geometrics of a device or make other changes prior to permanent installation.
11. **Monitoring.** Data collected prior to the implementation of traffic calming measures represents “before” data. Following implementation, “after” data should be collected at the same locations and in the same conditions in order to determine whether desired results have been achieved. Data should also be collected at other locations where new problems are identified, and data collected through the municipality’s annual data collection program should be reviewed to identify potential problems which might arise as a result of changes in travel patterns.

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5.3 Priorities

In the event that there are more locations with identified problems than can be addressed at once, the municipality will need to determine which locations should be addressed first. This section describes how priorities can be determined for selecting and implementing traffic calming measures. Priorities are determined based on a number of criteria, described below. For each criterion, a rating of 1 through 5 is applied, where 1 indicates that the criterion is not significant, and 5 indicates that it is very significant. Each criterion is then multiplied by a weighting factor, which indicates the relative importance of that criterion.

- **Reported collisions** (weighting factor of 2.0). This criterion is based on the number of reported collisions in the past three years. A rating of 1 indicates no reported collisions. Ratings of 2, 3, 4 or 5 are applied where collisions have been reported, with higher ratings for greater numbers of collisions as compared with other locations.
- **Pedestrian and cyclist activity** (weighting factor of 1.5). Locations with a relatively high number of destinations which attract pedestrian and cyclist traffic (such as schools, community centres, the Valley Trail and other recreational facilities) would receive high ratings, such as 4 or 5. Locations with low levels of pedestrian and cyclist activity would receive low ratings, such as 1.
- **Vehicle speeds** (weighting factor of 1.0). This criterion provides a measure of the speed of traffic in excess of the posted speed limit. A rating of 1 indicates no speed problems. Ratings of 2, 3, 4 or 5 are applied where 85th percentile traffic speeds exceed the posted speed limit. Higher ratings are applied where vehicle speeds exceed the posted speed by a greater amount, and where larger numbers of streets are affected.

The following hypothetical situation illustrates how these criteria and ratings would be applied:

- A section of roadway with two reported collisions in the past three years. The average number of collisions over the same time period on similar roadways is 1.3. Because the roadway in question has a higher-than-average number of collisions, it is given a rating of 4 for reported collisions. The total score for this criterion would therefore be 4 x 2.0 (the weighting factor) = 8.

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- The same section of roadway includes an elementary school and a Valley Trail crossing. It might therefore receive a high rating of 5 for pedestrian and cyclist activity. The total score for this criterion would therefore be 5×1.5 (the weighting factor) = 7.5.
- The observed 85th percentile speed on this section of roadway is 36 km/h in the 30 km/h school zone. Consequently, a relatively low rating of 3 for vehicle speeds is assigned, as speeds through school zones are typically in the range of 40 km/h. The total score for this criterion would therefore be 3×1.0 (the weighting factor) = 3.0.

The hypothetical section of roadway in the above example would receive a total score of $8 + 7.5 + 3 = 18.5$. This score would be compared with scores for other roadways to determine which are the highest priority.

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6. FINANCIAL

This section identifies the costs associated with traffic calming, and identifies means of funding traffic calming plans.

6.1 Costs

Estimated costs of implementing traffic calming measures are summarized in **Table 6.1**. It should be noted that these costs can vary, depending on design details such as the size of a device, the need to relocate catchbasins and utilities, and the extent of landscaping.

Table 6.1
Construction Costs of Selected Traffic Calming Measures

Measure	Estimated Cost (2001 dollars)
Chicane	\$10,000–\$20,000
Curb extension (each)	\$2,500–\$7,000
Raised crosswalk	\$2,500–\$5,000
Raised median island	\$3,000–\$10,000
Sidewalk extension	\$10,000–\$20,000
Speed hump	\$1,500–\$2,500
Traffic circle	\$5,000–\$10,000

6.2 Funding Sources

Currently, the municipality funds the costs of implementing traffic calming measures from general tax revenues, and it is recommended that Whistler continue with this approach for future implementation of traffic calming measures. The rationale for doing so is that other road and transportation improvements are funded from general revenues, and that safety improvements undertaken within a neighbourhood often benefit residents and visitors throughout the community. The disadvantage of this approach is that it may require either an increase in property taxes or reallocation of funds from other municipal services.

An alternative approach which is not recommended for Whistler is to fund traffic calming measures through a local improvement levy. The City of Coquitlam is the only municipality in B.C. which does not fund traffic calming measures from general tax revenues. Instead, Coquitlam

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has chosen to fund traffic calming plans through a local improvement levy imposed on all households within a neighbourhood. To avoid excessive costs for homeowners, the contribution from residents is capped at \$50 per household, with any excess cost funded from general revenues. Despite initial opposition, this approach appears to have been accepted by residents in Coquitlam.

In Saanich, initial attempts to impose a similar local improvement levy met significant opposition from residents who objected to having to pay to fix problems which they perceived as being caused by factors outside their neighbourhoods. In the face of this opposition, municipal Council decided to fund traffic calming from general tax revenues.

Supplementary funding sources, such as ICBC's Road Safety Program, can be used to reduce the costs of implementing traffic calming measures. ICBC's program makes funds available for roadway improvements that are anticipated to reduce collisions and ICBC's resulting claims costs. Funding is provided based on 50% of the estimated reduction in claims costs during the two years following implementation. In other words, if ICBC's analysis indicates that a proposed traffic circle is likely to reduce claims costs by \$6,000 over a two-year period, then ICBC would contribute \$3,000 to the cost of constructing the traffic circle.

7. TECHNICAL GUIDELINES

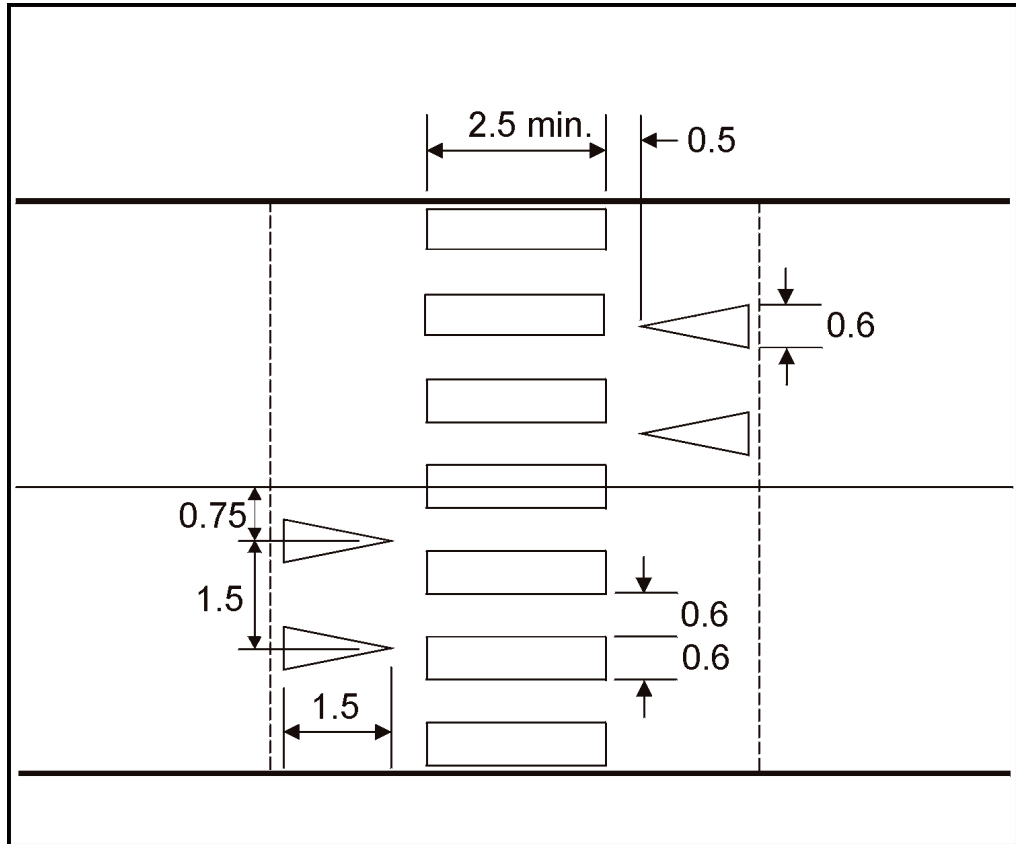
The following information regarding the design of traffic calming devices is intended to supplement or replace information presented in Section 4 of the *Canadian Guide to Neighbourhood Traffic Calming*, to reflect experience and new techniques developed since the Guide was published.

7.1 Design Guidelines

This section presents improved and modified designs for several traffic calming measures. These changes address deficiencies of the designs presented in the Guide, and reflect proven local practices.

- **Raised crosswalks** should be constructed to the dimensions described in the Guide. Pavement markings for the crosswalk portion should vary from those shown in the Guide. Instead of two parallel white lines across the road, the crosswalk should be indicated with “zebra” markings — white rectangles as illustrated in **Figure 7.1**. These zebra markings provide greater visibility of the crosswalk for approaching motorists than do the markings indicated in the Guide.
- **Roads without curbs.** Speed humps and traffic circles can be constructed on roads without curbs. In the case of speed humps, no additional design features are required. As illustrated in **Figures 7.2 and 7.3**, the hump should extend beyond the asphalt roadway approximately 0.5 m. Despite concerns that motorists will drive around the hump, or drive with the righthand wheels off the hump, in practice very few motorists attempt to do so. Placing “speed hump” signs adjacent the hump on both sides is sufficient deterrent to driving around the hump. If necessary, a 15x15 cm treated wooden post 1.0 m high (with reflectors) can be installed within 1.0 m of the edge of the hump to further deter motorists from driving around the hump.

**Figure 7.1
Raised Crosswalk Markings**



Constructing traffic circles on roads without curbs requires constructing short sections of curb on all four corners of the intersection, to force motorists to slow down as they travel around the traffic circle through the intersection. As illustrated in **Figure 7.4**, the gravel area on the back side of the curb should be at the same elevation as the surface of the road, and should not be backfilled to the height of the curb. This discourages motorists from driving over the curbs.

Curbs can be constructed of concrete or asphalt. To minimize the potential for damage from snow plows, concrete is preferred. Curbs should also be clearly marked with bollards or other devices so that snow plow operators can determine the locations of curbs.

Figure 7.2
Speed Hump Construction on Road Without Curbs

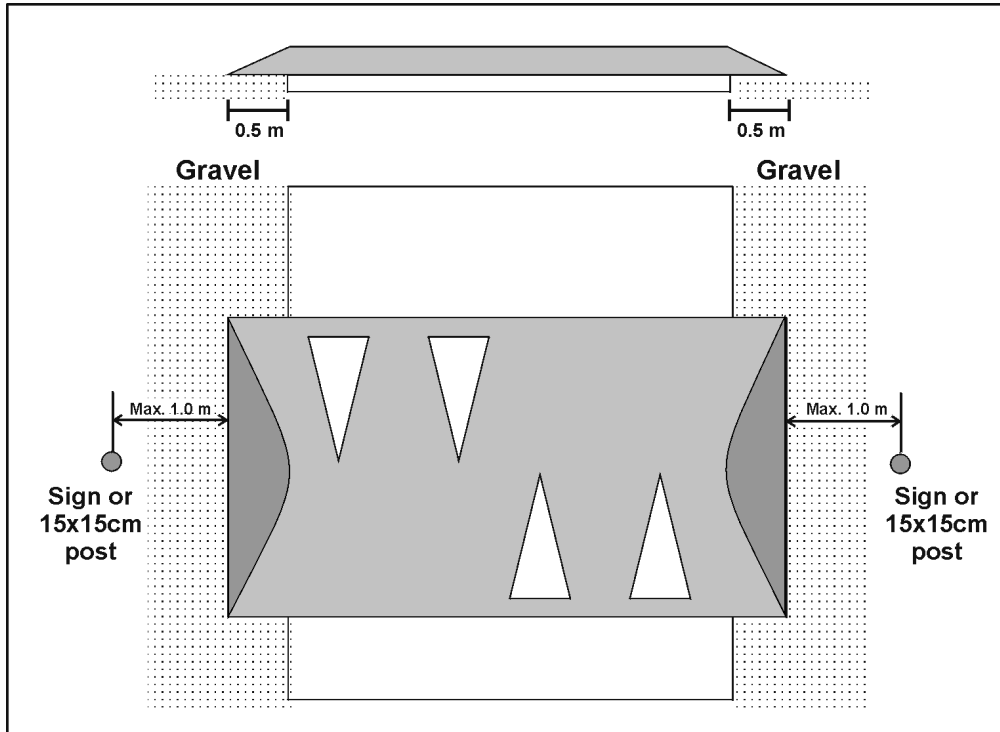
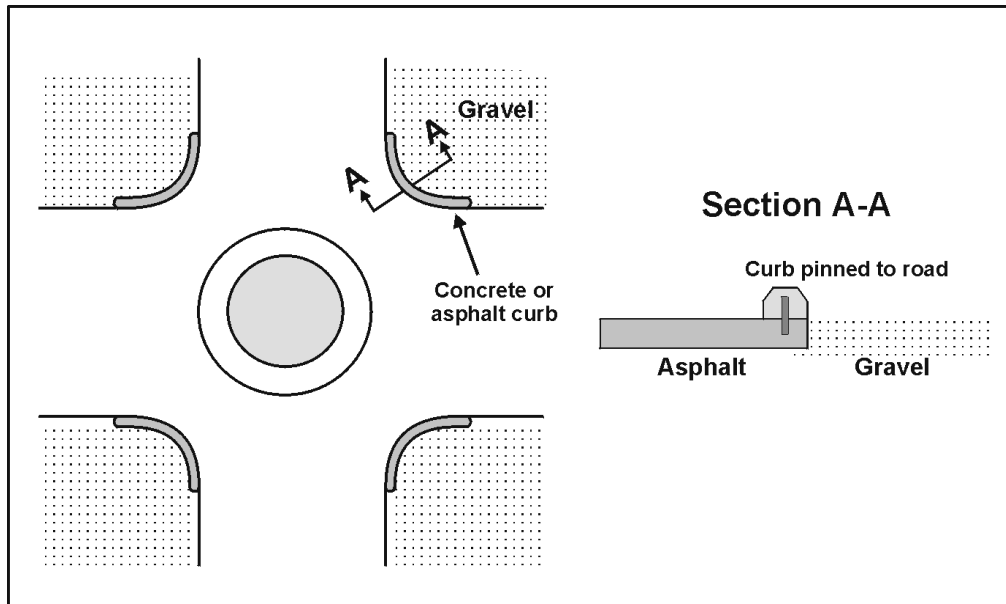


Figure 7.3
Speed Hump on Road Without Curbs

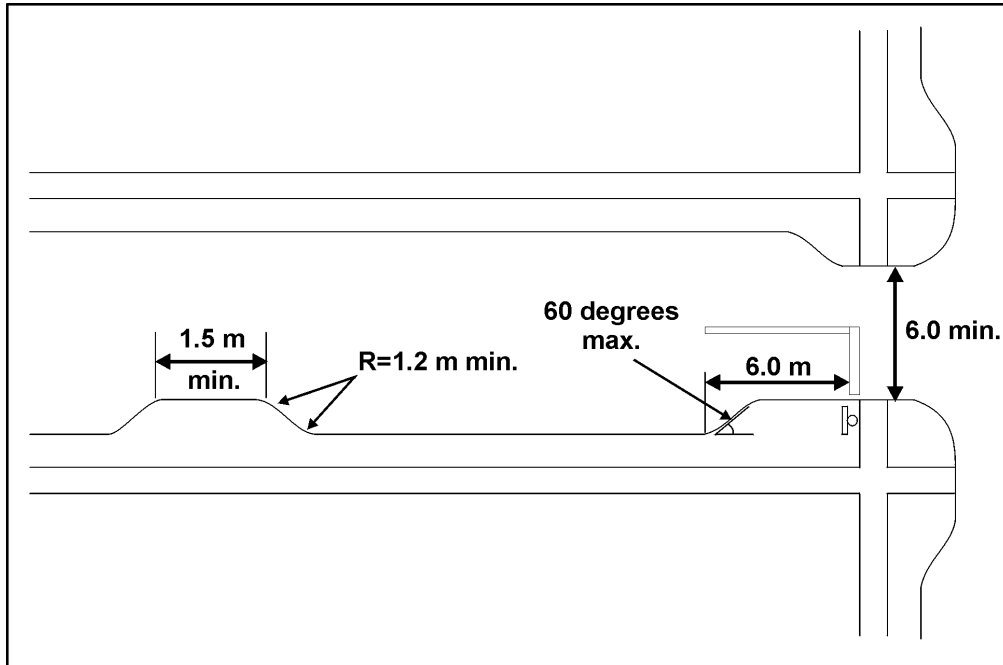


Figure 7.4
Traffic Circle Construction on Roads Without Curbs



- **Curb extensions.** The minimum dimensions indicated in the Guide for curb extensions (Section 4.3.2 of the Guide) are excessive, and might unnecessarily restrict access to driveways and reduce opportunities for on-street parking. **Figure 7.5** indicates minimum dimensions appropriate for conditions in Whistler — these dimensions are used for curb extensions in Vancouver and other Lower Mainland municipalities.

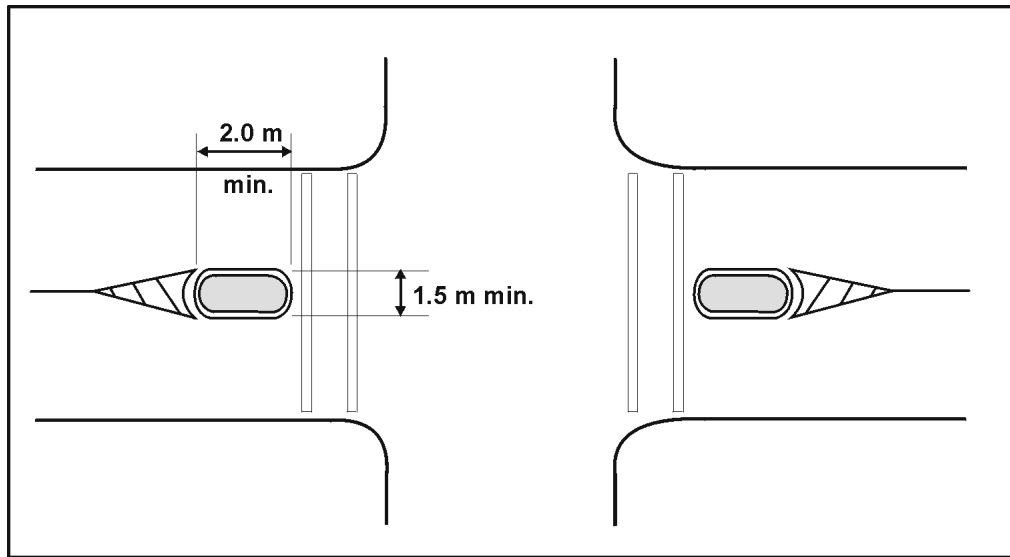
Figure 7.5
Minimum Dimensions For Curb Extensions



- **Traffic circle.** Landscaping should be included in the centre of a traffic circle, rather than a hard surface or a planter. Specific guidelines regarding landscaping include:
 - Asphalt should be removed from the centre of the traffic circle prior to landscaping. 150mm of pavement should be left along the inside edge of the traffic circle curb, so as to provide stability for the concrete curb.
 - The traffic circle should be filled with clean fill material. This should be covered by 75mm of topsoil, which should in turn be covered with 50mm of planting mulch.
 - A maximum slope of 3:1 should be used for material within the traffic circle.
 - Plant material should be selected which requires minimum irrigation during summer months, and minimum maintenance.
 - Trees may be placed within the centre of traffic circles. Circles less than 5m in diameter should include one tree placed in the centre of the circle. Circles larger than 5m in diameter can incorporate up to three trees, each of which is located at least 1.25m back from the curb face of the circle. Trees must be watered weekly for one hour during the first two years after planting.

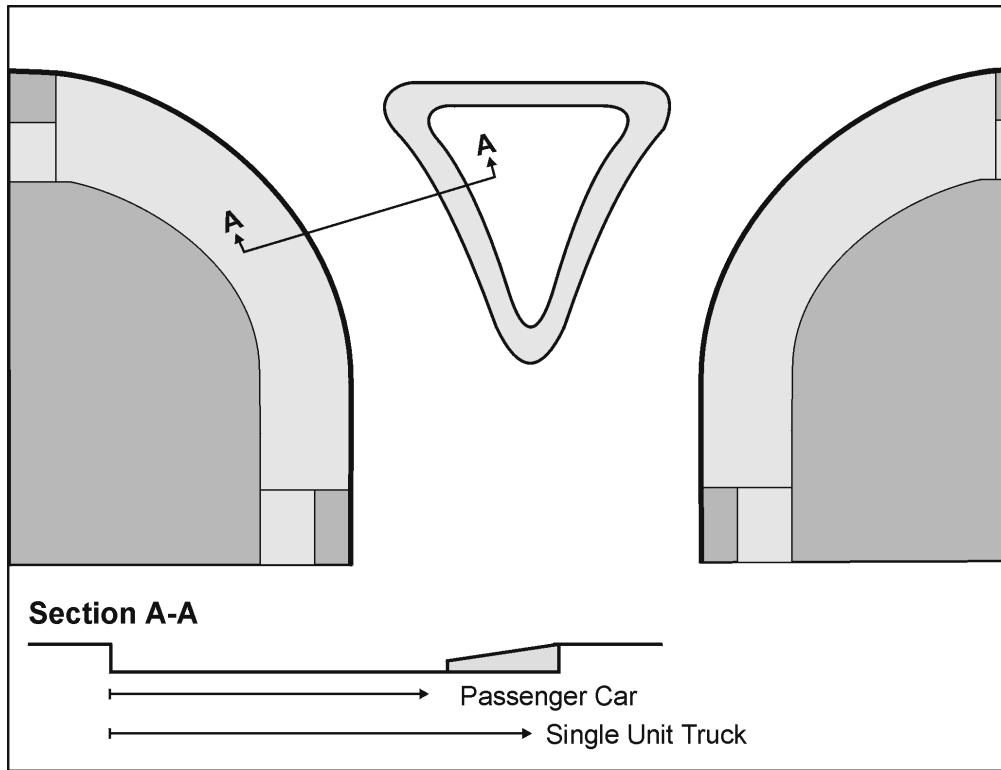
- **Raised median islands.** The minimum dimensions indicated in the Guide for raised median islands (Section 4.3.5 of the Guide) are excessive, and might unduly impact traffic operations and on-street parking on some streets. **Figure 7.6** indicates minimum dimensions appropriate for conditions in Whistler — these dimensions are used for raised median islands in Vancouver and other Lower Mainland municipalities.

Figure 7.6
Minimum Dimensions For Raised Median Islands



- **Right-in, right-out island.** The design of a right-in/right-out island should be based on two design vehicles — a passenger car and a SU-9 single-unit truck. As illustrated in **Figure 7.7**, the width of the roadway through the device should only be sufficient to accommodate the design passenger car. A sloping concrete apron (similar to that used on traffic circles) should be incorporated at a width sufficient to accommodate the design truck. This approach to the design of right-in/right-out islands helps to discourage motorists in passenger cars from attempting to circumvent the device by turning left or travelling straight through the intersection. If the width of the roadway through a right-in/right-out island is constructed so as to accommodate a single-unit truck, it is very easy for a motorist in a passenger car — particularly a compact car — to circumvent the device. This reduces the effectiveness of the device and creates an enforcement problem.

Figure 7.7
Right-In/Right-Out Island



7.2 Signage and Pavement Markings

This section describes additional or modified signage for traffic calming devices, to supplement information contained in the Guide.

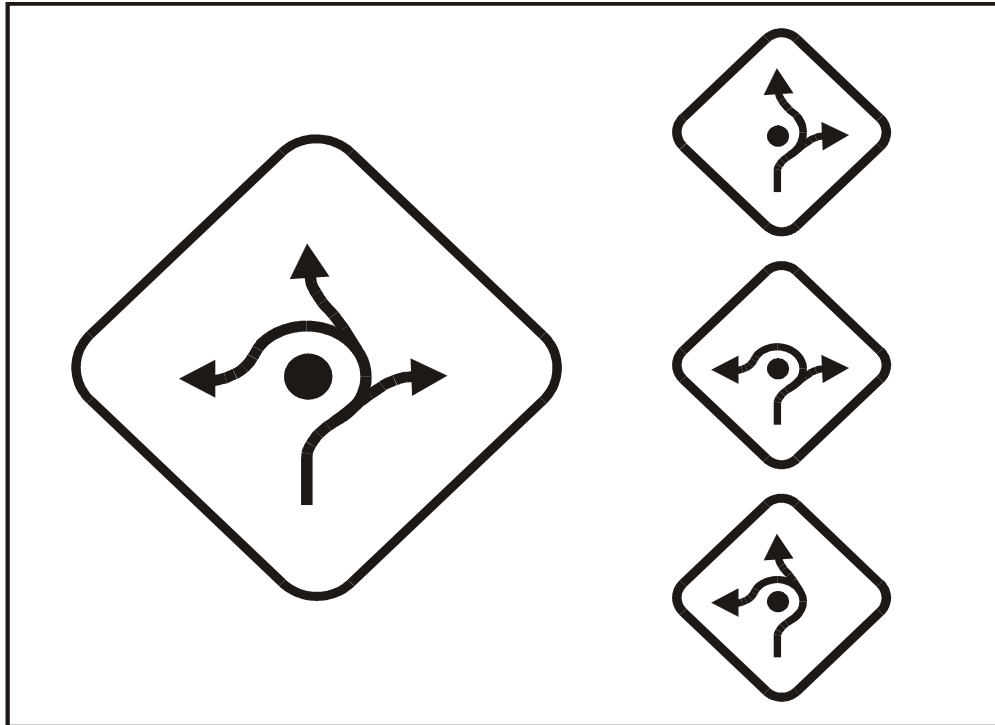
- **Speed hump signage.** On streets where a succession of speed humps have been installed, residents have sometimes complained of “visual pollution” from the signs located at each hump. An alternative approach used in Vancouver, Burnaby and many other municipalities in North America is to sign the entrances to each section of roadway (after each intersection) rather than sign every speed hump. When used in this manner, “speed hump” signs (WA-50) should be 750 mm x 750 mm for consistency with other warning signs, rather than the reduced size indicated in the Guide (which is used for “speed hump” signs located at each speed hump). Each sign should be installed with a tab identifying the length of roadway on which speed humps and other vertical deflections are used. This

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approach would not create a liability concern provided that pavement markings on the speed humps are maintained so that the humps are visible to motorists.

- **Object markers with curb extensions.** The Guide indicates that object markers (WA-36R) should be used with curb extensions. Although appropriate and necessary on arterial and collector roads, the use of object markers is optional on local residential streets. Residents often consider object markers to be “visual pollution,” and consequently their use on local streets should be minimized or avoided altogether.
- **Traffic circle signage.** Yield signs should not be used with traffic circles. This will ensure consistency with traffic circle installations elsewhere in B.C. and in west coast U.S. cities such as Seattle and Portland. Traffic circles should be identified in advance with a “Traffic Circle” warning sign, as illustrated in **Figure 7.8**. This sign not only alerts motorists and other road users to the presence of a traffic circle, but also illustrates how persons should travel through the intersection. If desired, the Traffic Circle sign can be modified as shown in **Figure 7.8** for installations at three-way intersections.

Figure 7.8
Traffic Circle Signs



7.3 Construction

The Guide does not provide information regarding construction techniques for traffic calming measures. In most cases, construction is relatively straightforward. For speed humps, however, there are a few important considerations, as described below.

To achieve the desired profile, speed humps and raised crosswalks should be constructed with two lifts of asphalt. Experience in other communities indicates that it is much easier to achieve the desired profile if a first lift of half-height is constructed, followed by the final lift, rather than attempting to form the entire hump to the desired profile in one lift. **Table 7.1** provides measurements for the first and second lifts along the length of the cross-section. The simplest way to ensure that each lift conforms to the desired profile is to construct a template from plywood, and pass this across the lift, shaping the asphalt as necessary to conform to the template, as illustrated in **Figure 7.9**.

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**Table 7.1
Speed Hump Profile**

Distance From Edge of Hump (m)	Finished Height (mm)	
	First Lift	Second Lift
0.000	0	0
0.125	0	1
0.250	0	3
0.375	0	7
0.500	0	12
0.625	0	18
0.750	0	25
0.875	4	32
1.000	11	40
1.125	19	48
1.250	26	55
1.375	33	62
1.500	38	68
1.625	43	73
1.750	47	77
1.875	49	79
2.000	50	80

**Figure 7.9
Shaping a Speed Hump With a Template**

