Traffic calming

Introduction

Traffic calming describes a range of techniques used to manage road users and the road environment to ensure speeds are appropriate to the local environment and the safety of other road users. When implemented correctly, traffic calming offers advantages to vulnerable road users, encourages modal choice and helps manage travel demand.

The visual appearance of any street should make it clear to a driver what is expected of them and what speed is reasonable. The design features and processes used to achieve this are known as traffic calming or traffic management.

Before any choice can be made about the type of measure to be used or even the suitability of traffic calming, it is necessary to determine the purpose for which the technique is intended.

In a busy urban environment, it is important to balance the daily needs of the community with those involved in commerce and those journeying through the area. In rural areas where the situation may appear less complex, the local community may have strong opinions about appropriate driving speeds.

Traffic calming features can be combined together as a package but generally fall into the following groups:

- vertical features
- horizontal features
- traffic management and control
- traffic signs and road markings
- zonal treatments.

Once the designer understands the purpose of the scheme and the characteristics of the location, different measure can be considered. This is the point at which it is often invaluable to involve the local community.

Objective

To control or influence traffic speeds and/or volumes so as to:

- improve road safety
- reduce actual and perceived risk to vulnerable road users to encourage their uptake as a mode of travel
- improve the local environment.

By altering travel speeds and travel times and by controlling ease of access, other modes can be made more attractive.

Benefits

Residents in neighbourhoods with suitable street environments tend to walk and cycle more, take public transport more and drive less than comparable households in other areas. One study found that residents in a pedestrian-friendly community walked, cycled or took public transport for 49 percent of work trips and 15 percent of their non-work trips, 18- and 11-percentage points more than residents in a comparable car-oriented community.

Benefits of traffic calming include:

- crash and casualty reduction
- traffic speed and volume reductions
- the promotion of alternative modes of travel, especially walking and cycling
- improved urban design
- improved urban environment
- economic regeneration
- perceptions of improved personal safety and less risk
- lower traffic noise and pollution.

Tools for traffic calming

Vertical features

Road humps

The term ‘road hump’ is generic. Road humps are constructed to different sizes and shapes to cater for different locations and situations. Indeed, any traffic calming scheme can contain a variety of hump types. Humps can be rounded and flat topped or be used to raise the level of a road at an intersection to the height of the footway (intersection plateau). Sinusoidal approach ramps offer comfort advantages to buses, cyclists and emergency services. (Also see topic 1 ‘Walking’ and topic 2 ‘Cycling’.)

Humps are rarely used individually but tend to form a series on a street or as an area-wide treatment to maintain uniform speeds.

Speed cushions

Speed cushions are small rectangular humps, resembling a seat cushion in shape. They are approximately the width of a car and usually placed in rows of 2 or 3 across the road width. Cushions are rarely used individually but tend to form a series on a street or across as an area-wide treatment to maintain uniform speeds. Cushions are particularly good at offering traffic calming benefits without significant adverse effects on bus or emergency service access.

Tools for traffic calming continued

Horizontal features

Road narrowing	Reducing the available road space for drivers can lower traffic speeds. Narrowing the road by re-allocating space to pedestrians and/or cyclists is one way of doing this.
Traffic islands	Islands reduce traffic space and slow traffic. Pedestrian refuges, splitter islands, etc all achieve this and have additional benefits in segregating other modes from the car or offering a crossing facility.
Footway build-out	Footway build-outs can improve conditions for pedestrians by narrowing crossing widths, reducing traffic speeds and offering better visibility. However, build-outs may adversely affect cyclists by creating pinch points.
Pinch points	When build-outs are established opposite each other, they pinch road widths. Pedestrian crossing widths are shorter and traffic speeds lowered. However, unless traffic speeds are

Tools for traffic calming continued

Traffic restriction and control

Parking management	Restricting on-street parking can contribute to traffic calming and help manage the road environment. Well-positioned parking will reduce conflict between motor vehicles and pedestrians and other vulnerable road users. In urban areas, where parking demand is high, waiting and loading restrictions combined with controls on parking duration and cost may be appropriate.
One- way systems	One-way systems can rationalise the number of side road accesses, improve capacity and parking and maintain safety in narrow streets. They may also be used to restrict access to particular modes, while other traffic takes a longer journey.
Vehicle restrictions and access	Restricting access to particular vehicles, may, depending on the vehicle type, allow design changes such as tighter corner radii and narrower streets etc. Conversely, promoting access to an area by particular vehicle types (eg buses in a CBD or cyclists in a pedestrian area) offers greater penetration and time/distance savings. Access to such lanes or areas can be established legally, with the associated signs, etc or by width constraints or rising bollards controlled by permitted vehicles. 'Bus gates' are a device used to permit access to buses only and controlled by loops, bus transponders and rising bollards. Bus gates give buses an advantage, such as priority access to traffic signals via a short road parallel road in congested areas.

Tools for traffic calming continued

Signs and road markings

Signs	Road signs are widely used to manage and control traffic. Permitted signs are detailed in the Land Transport Rule: Traffic Control Devices 2004 (TCD) and the *Manual of traffic signs and markings* part 1 (2007) (MoTSAM). Signs often supplement other traffic calming features, but, used alone, they rarely have a traffic calming effect.
Electronic signs	The use of electronic signs that give feedback to drivers is becoming increasingly common. Such signs generally alert drivers to their speed in relation to the speed limit, or to the need to slow down because of a hazard ahead. Electronic signs supplement standard signs, rather than replace them, and they are often used at locations where speed is known to contribute to a poor safety record, eg a bend or intersection. Normally such signs follow other unsuccessful attempts to address the issue. Driver speed feedback signs (displaying vehicle speeds to drivers) are used to influence driver behaviour and these have more of a value when sited after gateway and threshold treatments where there is a need to maintain lower speeds.
Road markings	Road markings are used to warn drivers of hazards on the highway and to separate traffic streams. Permitted signs are detailed in the Land Transport Rule: Traffic Control Devices 2004 (TCD) and *Manual of traffic signs and markings* part 2 (2008) (MoTSAM). Visually narrowing the road can be achieved or supported by road markings. It can occur at the margins of the road (cycle lane, parking area, shoulder, flush median) or in the centre of the road (central flush median). Narrowing, by adding features to the centre of the road, can adversely affect cyclists and pedestrians. Conversely, in some situations, removing road markings can create a calmer road environment. In some rural village locations where traffic volumes are low, the delineation and segregation that centrelines offer can encourage high speeds. As with road signs, road markings have a significant role to play in many traffic calming projects, but generally have little effect if used in isolation.
Gateways and thresholds	Gateways and thresholds draw the driver's attention to a significant change in the road environment ahead. Gateways and thresholds can bring together a number of techniques to have a greater impact on driver behaviour. For example, signs, markings, road narrowings, cycle lanes and coloured surfacing all combine to alert the driver. Some details relating to thresholds are contained in the Land Transport Rule: Traffic Control Devices 2004 (TCD) and the *Manual of traffic signs and markings* part 2 (2008) (MoTSAM).
Colour and surfacing	Colour (most often red or green) may be used to indicate a point of change or to raise awareness of a more risky location. Markings placed on coloured patches also seem to have a greater visual impact. Colour can be added to existing features to extend their life, but it should be used sparingly so that it retains its value at the locations where the most effect is desired. Surfacing types can also be varied to reinforce a combined environment for different users (eg a block-paved flat-topped hump to reinforce its informal use as a pedestrian facility to both pedestrians and drivers).

Tools for traffic calming continued

Zonal treatments

Pedestrian zones

Pedestrian areas can be established by limiting vehicle access to a street or series of streets. The decision must then be made about what kind of access should be allowed for other modes, such as cycles, public transport, service vehicles, etc. Very few areas are exclusively pedestrian and good urban design is central to giving vehicle drivers the message that they are guests in a pedestrian-dominated environment.

Lower speed zones

Establishing lower speed zones can have significant benefits for road safety, the environment, public spaces, community wellbeing and the promotion of alternative modes. For example, a 30km/h CBD zone, supported by traffic calming, public transport facilities and good urban design, will enhance the economy and attractiveness of any urban environment.

Where to apply these tools

	Centre	Urban	Suburban	Rural
Road humps				
Speed cushions				
Road narrowing				
Traffic islands				
Footway build-outs				
Pinch points				
Chicanes				-
On-road cycle lanes				
Mini roundabouts				
Rumble strips				
Rumble wave				
Parking management				
One-way systems				
Vehicle restrictions				-
Signs				
Electronic signs				
Road markings				
Gateways and thresholds				
Colour and surfacing				
Pedestrian zones				
Lower speed zones				

This table provides an indication of appropriate location only.

Case study – Brynley Street traffic calming proposal – Christchurch City Council

Christchurch City Council consulted residents and service providers in 2008 about proposals to calm traffic in Brynley Street, Hornby. Plans included build-outs and speed humps, as well as planting and improved street lighting.

Although two roundabouts had been constructed in the street in 2002/3, excessive traffic speed continued to cause concern. Since street renewal was unlikely to occur for many years, interim traffic calming measures were considered necessary.

Project objectives

- Reduce the speed and number of vehicles on Brynley Street, particularly at the intersection of Trevor Street and Okehampton Street.
- Maintain or improve safety for all users.
- Meet network-accepted standards and engineering best practice.
- Introduce traffic calming to break up the long straight roads.
- Construct the project in 2008/9.

Project proposals

- Place eight speed humps approximately 120m apart to reduce speed and traffic volumes and complement the two existing roundabouts.
- Attach speed humps to kerb build-outs on each side of the road. in a 3m wide semi-circle.
- Plant trees on each build-out to enhance streets and make road appear narrower.
- Allow for a 1m space between the kerb and dish channel and the build-out to allow kerb sweeping and maintenance.
- Upgrade street lighting at the road humps.
- Plant low shrubs (up to 500mm high) at the roundabouts to improve landscaping and raise the profile of the roundabouts.

Consultation

- Leaflets describing the project were delivered to households and made available on the council's website.
- Freepost return feedback forms were attached to the consultation leaflet.
- Project drop-in sessions were held at a local Plunket.
- Consultation results and project decisions were presented to the Community Board Transport and Roading Committee.

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(The project is now in construction.)

Case study – SaferRoads – Newtown and Berhampore – Wellington City Council

Introduction

SaferRoads is a programme adopted by Wellington City Council in 2003 to reduce speeds on residential and side roads. This is being promoted through a combination of lower speed limits and traffic calming on the residential and side roads. On arterials roads, however, where lower speeds are not always appropriate due to their wider role within the city network, the council used new and existing traffic signals.

The city was divided into 23 community areas and the SaferRoads programme is addressing each area using the following four-stage model:

1 **Community workshops**
These inform the local community of the programme objectives, gather information about road safety issues and trends in the area, and develop a framework for crash reduction. The Community Participation summary covers the information obtained in the workshops.

2 **Safety improvements**
Following consultation with local schools, concept plans are approved and local safety improvements, enforcement strategies and education campaigns are identified. The resulting technical report sets out workshop and school consultation summaries, costs, priorities and photos and suggested designs.

3 **Public input**
The public provides feedback on the proposed work.

4 **Implementation**
The council has spent $6 million on the SaferRoads programme so far. The overall total project cost is $21 million.

Since 2003, SaferRoads has been implemented in Tawa, Ngaio, Khandallah, Northland, Wilton, Wadestown, Thorndon and Karori. Crash statistics show early success in Tawa, Ngaio and Khandallah. It is too early to draw any conclusions on the other four suburbs, but feedback from the community has generally been positive.

Case study – SaferRoads – Newtown and Berhampore – Wellington City Council continued

Newtown and Berhampore

In November 2005, the **Newtown and Berhampore** communities were invited to workshops on road safety issues. They identified speed, intersections, pedestrians, cycles, parking and general roading issues such as lighting and road width as key areas that needed to be addressed. The analysis of crash numbers and types showed that intersection, parking, pedestrian and loss of control crashes were prevalent in Newtown and Berhampore, correlating with the community feedback. The primary objective of SaferRoads is to reduce crashes by at least one-third, and the best way to achieve this is to decrease vehicle speeds.

The majority of crashes in Newtown and Berhampore occurred on the main routes through the suburbs. About three-quarters of the reported injury crashes since 2002 have occurred on Riddiford Street, Adelaide Road, Rintoul Street and Constable Street. For this reason, the proposed changes were mainly focused on these roads as the greatest benefits could be gained here. However, priority was also given to providing appropriate measures for residential streets to make these areas safer for residents. Here, the council implemented designs with traffic management, implicit road network hierarchy and speeds in mind.

During the consultation phase, workshop participants provided useful information about the issues and concerns in the area. The key issues related to intersections, speed, parking, night-time, pedestrians and schools/kindergartens/crèches. Participants provided their ideas about potential solutions, which were included in the design of the road safety measures proposed here.

At the end of the consultation phase, schemes were developed and concept plans prepared for each of the sites identified as needing attention. The implementation schedule and concept plans provide the framework for the SaferRoads programme.

The framework included:

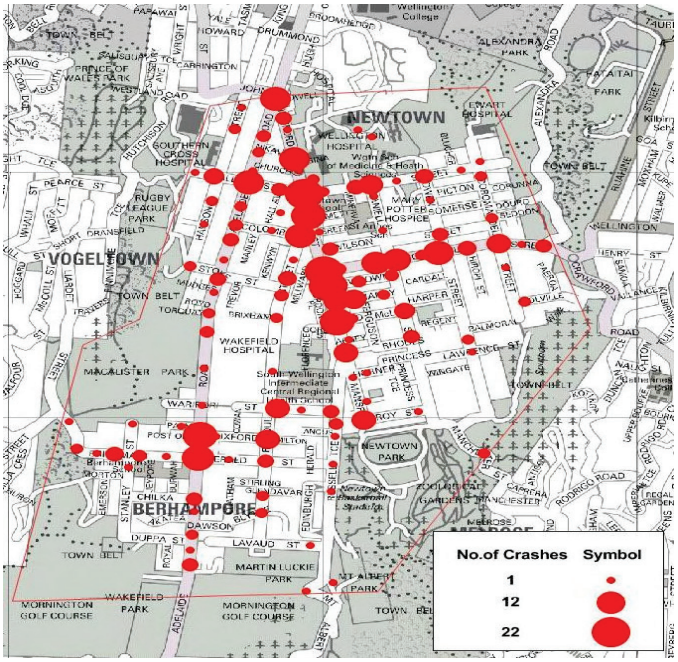
- traffic signals on arterial routes (new and existing installations)
- kerb extensions, median islands, speed humps, rationalising intersection controls and parking management in the area
- lower speed limits (40km/h across the area), with supporting traffic calming in residential areas
- identifying arterial routes and improving the road markings for all roads in Newtown and Berhampore
- education and enforcement programmes to improve safety and reduce injury crashes.

The proposed works have an estimated cost of $1.64 million.

Traffic calming installation and speed limit changes were implemented in 2008/9, with traffic signal upgrades and installation due in 2009/10.

Case study – SaferRoads – Newtown and Berhampore – Wellington City Council continued

Newtown and Berhampore continued



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Case study – River Road traffic calming proposal – Hamilton City Council

Introduction

River Road is an important arterial road in the north-east of Hamilton and is a key feeder to Hamilton's ring road system. The council is in the process of finalising the plans to upgrade River Road from Sylvester Road to Te Huia Drive to urban standards.

Consultation was carried out on both the form and function of the corridor through the designation process in 2005. Since then, the council has successfully worked with property owners and developers to purchase the land required for the project. Consultation involved leaflets and use of the council website but also a focus group to try to involve the community in developing a 'self-explaining road'. This group considered both the engineering designs to manage speeds but also driver behaviour and education.

Project objectives

The upgrade of this section of River Road to urban standards will provide for vehicle traffic, public transport, cycling and walking facilities, and a more attractive complete environment.

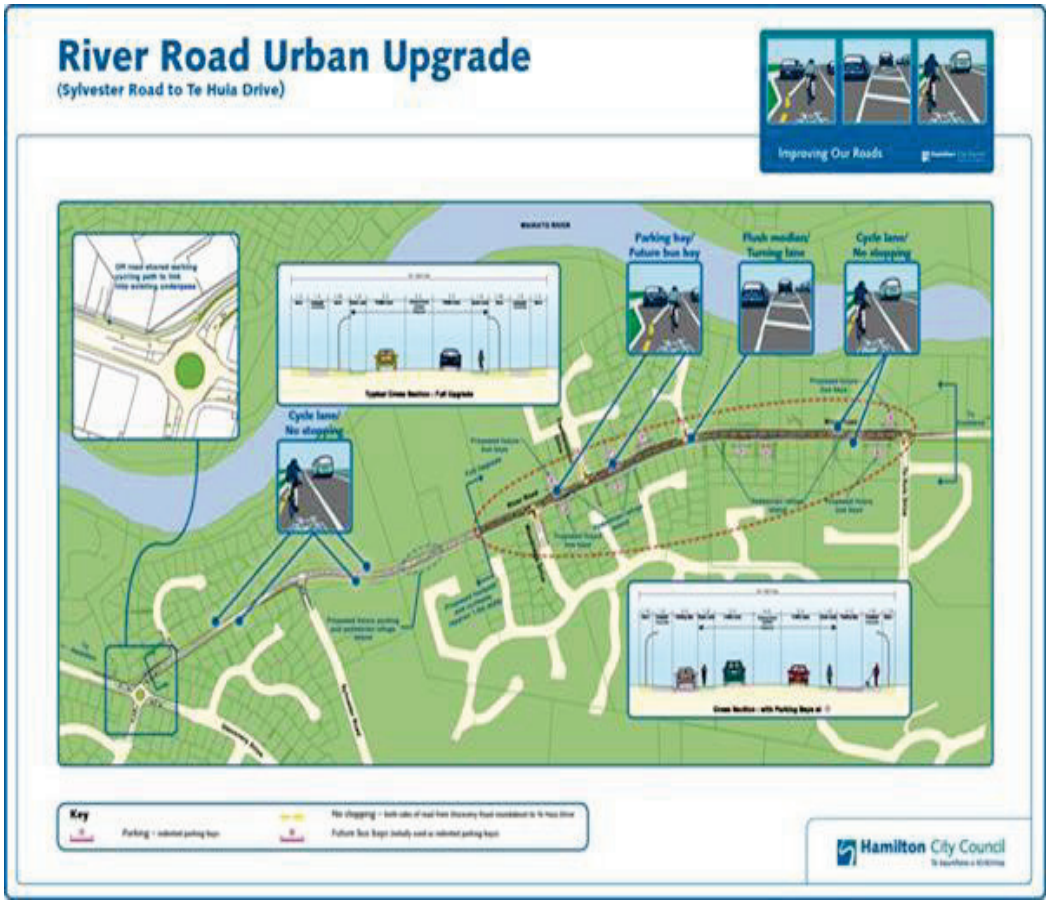
The contract is expected to be completed during the 2009/10 summer.

The council and contractor issue monthly updates to the community on progress on the project, from planning for the project to construction.

This urban upgrade involves:

- widened road carriageway
- provision of parking at key locations through new indented parking bays and future bus bays along the road (see upgrade feature icons on the map)
- safe on-road cycle lanes and on-street parking limited to indented parking bays – from the Discovery Drive roundabout to Te Huia Drive (see upgrade feature icons on the map)
- installation of kerb and channel
- new concrete footpaths linking to existing footpaths on river road
- short off-road shared walking/cycle path linking the Discovery Drive underpass to the new River Road on-road cycle lane (see the map insert)
- pedestrian refuge islands at key locations to improve pedestrian safety across the road
- tactile pads to assist visually impaired pedestrians at the crossing points
- final road surfacing in chip seal and a central painted flush median to enable safer right turns for vehicles at intersections and into properties (see upgrade feature icons on the map).

Case study – River Road traffic calming proposal – Hamilton City Council continued



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Case study – State Highway 1, Te Horo, Wellington region

Introduction

Much of the state highway road network acts as a means of moving longer-distance travellers and freight. Occasionally, the state highway network runs through communities in rural settings where traffic speeds are higher than is appropriate for traditional traffic calming techniques.

In such speed environments (>70km/h), the techniques employed are based around visually changing the road's appearance to reinforce the slightly lower speeds in these communities. This will involve road markings, threshold signing, warning signs and possibly electronic signs.

Te Horo

State Highway 1 runs through a number of rural communities, including Te Horo, just south of Otaki.

Here, Te Horo sits in a rural 100km/h area and the residents and businesses sought a lower speed for their community. An 80km/h speed limit was introduced, supported by visual changes to the road layout. These included:

- central road markings to narrow the road and provide for right-turn vehicles
- consistent and adequate shoulder widths to narrow the road, but also to cater for cyclists
- gated threshold signs at the entry to Te Horo
- warning signs to alert motorists of pedestrians
- footway provision where appropriate.

Case study – State Highway 1, Te Horo, Wellington region

continued

Te Horo

continued

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Case study – Project for Public Spaces – North America

Introduction

Project for Public Spaces (PPS) is a non-profit organisation dedicated to helping people create and sustain public spaces that build stronger communities. Founded in 1975, PPS embraces the insights of **William (Holly) Whyte**, a pioneer in understanding the way people use public spaces. Today, PPS has become an internationally recognised centre for best practice, information and resources about urban design.

PPS has developed a toolkit for traffic calming in North America. It is founded on the idea that streets should help create and preserve a sense of place where people can walk, meet, play, shop and even work alongside cars, without being dominated by them. Techniques used lessen the impact of motor vehicle traffic by slowing it down, or literally calming it. This helps build human-scale places and an environment friendly to people on foot.

Case study – Project for Public Spaces – North America

continued

Traffic calming

Traffic calming improves the liveability of a place and can be applied inexpensively and flexibly. The strategies outlined below in *The traffic calming toolbox* can be employed by painting lines, colours and patterns, using planters, bollards and other removable barriers, eliminating or adding parking or installing footpath extensions or similar structures with temporary materials.

Features covered include:

- diagonal parking
- changing one-way streets to two-way
- widening footpaths/narrowing streets and traffic lanes
- bulbs – chokers – neckdowns
- chicanes
- roundabouts
- traffic circles
- raised medians
- tight corner curbs
- diverters
- road humps, speed tables, and cushions
- rumble strips and other surface treatments.

www.pps.org/

www.pps.org/info/placemakingtools/casesforplaces/livememtraffic

Case study – Traffic calming *Roadway design to reduce traffic speeds and volumes*, Victoria Transport Policy Institute TDM Encyclopedia

Road diets

Road Diets and Environmentally Adopted Through Roads refers to traffic calming applied to higher-volume arterial roads. The theory and practice in 'road diets' involves, for example, converting four traffic lanes to three traffic lanes, with a centre turn lane and cycle lanes, and various pedestrian and aesthetic improvements. This is typically suitable for roads with up to 20,000 average motor vehicles per day. Stout, et al (2006) found that conversion of four-lane undivided roadways to three-lane cross sections in typical Iowa towns reduced crash frequency by 25 percent and crash injuries by 34 percent. Where road diets include the addition of cycling lanes, cycle travel typically increases 20–30 percent. Table 1 summarises crash reduction benefits for some recent projects of this type.

Table 1 Road diet crash reduction impacts (Seattle DOT)

Roadway location	Date change	ATD before	ADT after	Collision reduction
Greenwood Ave N, N 80th St to N 50th	April 1995	11,872	12,427	24 to 10 (58%)
N 45th Street, Wallingford Area	December 1972	19,421	20,274	45 to 23 (49%)
8th Ave NW, Ballard Area	January 1994	10,549	11,858	18 to 7 (61%)
Martin Luther King Jr Way, North of I 90	January 1994	12,336	13,161	15 to 6 (60%)
Dexter Ave N, Queen Ann Area	June 1991	13,606	14,949	19 to 16 (59%)
24th Ave NW, NW 85th to NW 65th	October 1995	9,727	9,754	14 to 10 (28%)

Table 1 summarises the crash reduction effects of road diets on major arterials in Seattle, Washington. (ATD = Average Daily Traffic)

Case study – Traffic calming *Roadway design to reduce traffic speeds and volumes*, Victoria Transport Policy Institute TDM Encyclopedia continued

Traffic calming

Traffic calming should see reductions in vehicle traffic speeds and sometimes volumes. Table 2 summarises the traffic speed impacts of various traffic calming devices. Even where speed reductions are small, traffic calming tends to reduce the highest traffic speeds (ie the fastest 5–15 percent of vehicles), and this in turn provides greater safety and noise reduction benefits than indicated by average reductions.

Traffic studies have determined in general that for every 1 metre increase in street width, the 85th percentile vehicle traffic speed increases 1.6km/h, and the number of vehicles travelling 8–16km/h or more above the speed limit increases exponentially. It might be expected that, as residential street traffic speeds increase, neighbourhood liveability ratings decline.

Table 2 Speed impacts of traffic calming measures (Ewing, 1999)

	Sample size	Avg. speed afterward (mph)	Avg. speed change	Avg. % change
12' humps	179	27.4	–7.6	–22
14' humps	15	25.6	–7.7	–23
22' tables	58	30.1	–6.6	–18
Longer tables	10	31.6	–3.2	–9
Raised intersections	3	34.3	–0.3	–1
Circles	45	30.2	–3.9	–11
Narrowings	7	32.3	–2.6	–4
One-lane slow points	5	28.6	–4.8	–14
Half closures	16	26.3	–6.0	–19
Diagonal diverters	7	27.9	–1.4	–0.5

From www.trafficcalming.org.

As mentioned earlier, traffic calming can have positive effects on travel volumes. This is often related to travel times (speed management) and perceived safety. Table 3 summarises the likely positive travel impacts of traffic calming.

Case study – Traffic calming *Roadway design to reduce traffic speeds and volumes*, Victoria Transport Policy Institute TDM Encyclopedia continued

Traffic calming continued

Table 3 Travel impact summary

Objective	Rating	Comments
Reduces total traffic	2	Discourages automobile traffic and increases travel alternatives
Shifts automobile travel to alternative modes	2	Improves walking and cycling conditions and discourages automobile use
Improves access, reduces the need for travel	1	Encourages higher-density, mixed land use
Increased public transit	1	Improves access to transit
Increased cycling	2	Improves cycling conditions
Increased walking	3	Improves walking conditions

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Case study – Traffic calming *Roadway design to reduce traffic speeds and volumes*, Victoria Transport Policy Institute TDM Encyclopedia continued

Traffic calming / speed management benefits and costs

Traffic calming benefits and costs are summarised in table 4.

Table 4 Traffic calming impacts (Litman, 1999)

Benefits	**Description**
Increased road safety	Reduced traffic accident frequency and severity, particularly for crashes involving pedestrians and cyclists
Increased comfort and mobility for non-motorised travel	Increased comfort and mobility for pedestrians and cyclists
Reduced automobile impacts	Increased non-motorised travel substitutes for automobile trips, reducing congestion, expenses and pollution
Increased community liveability	Reduced noise and air pollution, and improved aesthetics
Increased neighbourhood interaction	More hospitable streets encourage street activities and community interaction
Increased property values	Reduced traffic speed and volumes increase residential property values.
Public health	More opportunities for walking and other physical activity
Costs	**Description**
Project expenses	Financial costs associated with implementing and maintaining traffic calming facilities
Liability claims	Increased liability claims caused by traffic calming
Vehicle delay	Reduced traffic speeds. Motorists either increase their travel time or reduce travel distance
Traffic spillover on other streets	Traffic calming on one street can shift traffic to other streets
Problems for emergency and service vehicles	Delay to fire trucks, and problems for buses, garbage trucks and snow plows
Increased drivers' effort and frustration	Increased effort required for driving on traffic calmed roads and the resulting frustration
Problems for cyclists and visually impaired pedestrians	Some traffic calming strategies cause problems to bicyclists or visually impaired pedestrians

As can be seen above, there are pros and cons to traffic calming and speed management but there are noticeable benefits beyond those that might be expected in the form of traffic safety, travel choices, reduced traffic speeds and volumes. Beyond these more obvious benefits, health improves, the local retail economy can be stimulated, property and retail values can increase and the attractiveness and personal security in an area can improve.

Complementary measures

Many features used to provide for specific road users are actually also forms of traffic calming. For example, providing a pedestrian facility in the form of a central pedestrian refuge island also represents a road narrowing and traffic calming device. With this in mind, it can sometimes be advantageous to promote a feature like a bus or cycle lane as a speed management tool through road narrowing rather than a means of providing for a minority road user group.

Other complementary measures include:

- walking and cycling facilities
- urban design and land-use planning
- public transport
- parking management
- urban renewal.

What other policies may this address

	Walking and cycling
	Public transport
	Priority lanes
	Parking management
	Land use
Other external policies	2010 road safety targets
	2020 road safety vision and targets
	Health
	Environment
	Economic
	Crime
	Equity and equality
	Treaty of Waitangi

Further info and relevant research

International sites

Chartered Institution of Highways and Transportation
www.ciht.org (accessed 20 January 2010)

Institute of Transportation Engineers
www.ite.org (accessed 20 January 2010)

Traffic Calming.org
www.trafficcalming.org (accessed 20 January 2010)

San Francisco
www.sfgov.org/site/dpt.index.asp?id=13563 (accessed 20 January 2010)

Project for Public Spaces (USA)
www.pps.org (accessed 20 January 2010)

Traffic calming 101
www.pps.org/info/placemakingtools/casesforplaces/livememtraffic
(accessed 20 January 2010)

Traffic advisory leaflets
www.dft.gov.uk/pgr/roads/tpm/tal/ (accessed 20 January 2010)

Department for Transport (2007) *Manual for streets*. Wetherby: DfT Publications. www.dft.gov.uk/pgr/sustainable/manforstreets/ (accessed 20 January 2010)

Department for Transport (2007) *Traffic calming*. Local transport note 1/07. London: DfT. www.dft.gov.uk/pgr/roads/tpm/ltnotes/pdfltn0107trafficcalm.pdf (accessed 20 January 2010)

Department for Transport (2008) *Cycle infrastructure design*. Local transport note 2/08. London: DfT. www.dft.gov.uk/pgr/roads/tpm/ltnotes/ltn208.pdf (accessed 20 January 2010)

Department for Transport (2008) *Traffic management and streetscape*. Local transport note 1/08. London: DfT. www.dft.gov.uk/pgr/roads/tpm/ltnotes/ltn108.pdf (accessed 20 January 2010).

Department for Transport (2004) *Policy, planning and design for walking and cycling: Consultation draft*. London: DfT.
www.capic.org.uk/documents/policy_planning_and_design_for_walking_and_cycling_oct_2004.pdf (accessed 20 January 2010)

Best practice case studies
www.ctc.org.uk/DesktopDefault.aspx?TabID=4384 (accessed 20 January 2010)

Transport for London. London cycling design standards.
www.tfl.gov.uk/businessandpartners/publications/2766.aspx (accessed 20 January 2010)

Transport for London. Cycling. www.tfl.gov.uk/roadusers/cycling/11598.aspx (accessed 20 January 2010)

County Surveyors Society www.cssnet.org.uk/ (accessed 20 January 2010)

Further info and relevant research continued

New Zealand

Road and traffic standards series (LTSA)

Land Transport Safety Authority (1990) *Guidelines for the implementation of traffic control at crossroads* (RTS 1). Wellington: LTSA. www.nzta.govt.nz/resources/road-traffic-standards/rts.html (accessed 20 January 2010).

Land Transport Safety Authority (1991) *Guidelines for flush medians* (RTS 4). Wellington: LTSA. www.nzta.govt.nz/resources/road-traffic-standards/rts.html (accessed 20 January 2010)

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An updated review of an earlier guidance book on traffic calming that reviews previous projects and discusses results, best practice and the future of traffic calming. This has in many ways become the definitive UK design guide for traffic calming.

Chapter 1 Introduction

Chapter 2 Traffic Calming the Context

Chapter 3 The Design and Implementation of Traffic Calming Measures

Chapter 4 Techniques in Traffic Calming

Chapter 5 Lessons Learned from Experience

Chapter 6 Traffic Calming the Future

Chapter 7 Earlier Schemes Reviewed

Chapter 8 More Recent Schemes

Can be purchased from: www.ciht.org.uk/en/publications/index.cfm/traffic-calming-techniques-2005

Complementary measures

Public transport

Cycling

Walking

Accessibility

Urban design

Priority lanes

Land use

Parking

Other policies addressed

Congestion

Economic efficiency

Public health

Land use