THE WHOLE BOX'N'DICE OF TRAFFIC CALMING EXPERIENCES IN LOCAL GOVERNMENT

Peter Damen, peterd@level5design.com.au

Principal and Chief Executive Officer, Level5design Australia https://www.level5design.com.au

Abstract

Traffic calming, often referred to as local area traffic management (LATM), is a field of local government practice that is often applied more as art than science. In the 1980s and early 1990s there was a great deal of activity in the field and practitioners were regularly innovating and pushing the boundaries for the benefit of the whole profession. More recently this has been happening much less such that many would say it is now more difficult for local government engineers to effectively learn and benefit from each other's experiences.

As a means of combating this situation and promoting good practice in the field of local area traffic management, this paper provides a comprehensive update on recent local government experiences in Australia and New Zealand. It presents the findings of extensive research and consultation undertaken in late 2006 with input received from more than 150 local governments.

A range of topics are covered including:

- the hierarchy of traffic issues facing Councils
- the types of devices that are in common use
- those treatment types that are most favoured
- the application of warrant criteria
- what has been the most and least effective treatment types, and why
- the cost of implementation of different device types
- the devices that are most complained about and why
- the methods used for post construction monitoring.

Key Words: Traffic calming, speed management, local area traffic management

Good practice examples of commonly used devices (a roundabout and speed cushions) are shown below:

Introduction

Ever since there have been cars on our roads there have been traffic issues to deal with and various schemes promoted to 'calm' the negative effects of traffic. Traffic calming is by no means a new thing. Its wider application may have changed from time to time to respond to emerging technologies, trends and behaviours but essentially its basic premise remains - the need to improve the liveability and amenity of our local neighbourhoods.

The progress of innovation in traffic calming in our part of the world is quite interesting. It would seem that it has moved forward in stages in Australia and New Zealand with very little reported progress in recent years.

In the 1970s, 1980s and 1990s there was a reasonable amount of progress made. And at the same time many local government practitioners were encouraged to share the findings of their research and development with the wider practising local government community. However, since that time there has been a general decline in the amount of research and innovation being promoted and reported.

As a means of combating this situation and promoting good practice in the field of local area traffic management, a program was initiated involving contacting a wide cross-section of local governments throughout Australia and New Zealand and researching their practices and processes.

Practitioners from local government and elsewhere are encouraged to follow this lead and share their experiences where it might have benefits for the wider local government engineering community.

Traffic calming – what is it?

The Austroads Guide to Traffic Engineering Practice – Part 10 (Damen, Brindle and Gan, 2003) defines traffic calming as 'physical, educational and management approaches to reducing the impacts of vehicles on urban areas.' It goes further to state that 'LATM is a tool of traffic calming at the local level'…and…'while LATM is only one of the possible applications of traffic calming, it is by far the most common and, for most practical purposes, the two terms are synonymous.'

The Transportation Association of Canada (1998) defines traffic calming as '…the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorised street users.'

Finding out about current practices

In August 2006 a survey was conducted to gather information on traffic calming practices employed by local government authorities in Australia and New Zealand. The survey was conducted over a 44 day period. Practitioners were contacted via email and telephone with responses gathered online, via mail and telephone.

In total, valid survey responses were received from 161 local government authorities from every State and Territory in Australia and from New Zealand. Table 1 shows the breakdown of the number of respondents. New South Wales had the most responding councils with 42. A similar number of respondents were received from Queensland, South Australia, Victoria and Western Australia.

The table also indicates the classification of each of the councils in terms of its remoteness rating. This rating was based on the Australian Classification of Local Governments using population, population density and proportion of the population classified as 'urban' to categorise a council.

Table 1: Number of responses received in Australia and New Zealand classified by degree of remoteness

Category	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	NZ	Total
Urban capital city	1			1	1				1	4
Urban develop-ment		5			7		10	5	1	28
Urban regional		16	2	8	3	5	8	5	9	56
Urban fringe		4		5	4		5	3	1	22
Rural		17		12	5	2	4	10		50
Remote								1		1
Total	1	42	2	26	20	7	27	24	12	161

Scope of the consultations

Local governments were consulted on a broad spectrum of different topics ranging from the types of devices that they commonly employ, through to device effectiveness and application, cost of treatments, etc.

Some of the outcomes of the survey are given in the following sections.

Traffic related issues affecting local communities

Local councils see speeding as the biggest traffic issue affecting local communities, with 46% of respondents ranking it as their highest priority (Table 2). In contrast, only 3% of councils rated the local environment as being the highest priority.

Rural towns do not face the same traffic issues as urban councils. Numerous rural councils commented that due to their size, they do not face many traffic issues and the ones they do face are minor. Hay Shire (NSW) was one such council stating that their traffic issues are minor and traffic calming methods are rarely needed.

Table 2: Ranking of priority traffic issues (with 1 being of lowest priority and 5 being of highest priority)

	Ranking of priority (%)				
Traffic issue	**1**	**2**	**3**	**4**	**5**
Speeding	3	4	18	29	46
Through traffic	8	15	31	35	11
Commercial vehicle impacts	6	27	39	18	10
Local environment quality (noise, air quality, etc.)	10	34	39	14	3
'Hoon' behaviour	3	11	24	31	31
Roadcrashes/blackspots	5	19	30	30	16
Access to parking	15	21	25	23	16
Compatibility for pedestrian and bicycle movement	4	22	37	28	9
Other	38	0	9	38	15

Devices in common use

In Table 3 there is a list of 23 traffic calming (or local area traffic management) devices and how commonly each of these devices is used by Australian and New Zealand councils.

From the responses received, the most commonly used devices are one way / stop / giveway signs, with 66% of respondents indicating their council uses them regularly. Roundabouts appear to be nearly as common with 61% of councils stating that they use these devices regularly.

The least used physical traffic calming devices are bus only links / bus bypasses with 84% of responding councils indicating that they have rarely or never used these devices.

Effectiveness of devices

Table 4 indicates how effective each council rated the traffic calming devices that they had installed. Roundabouts and full road closures were the two most effectively ranked devices. In total, 43% and 35% of the respondents gave the roundabout and full road closures this effectiveness rating respectively. Bus only links / bus bypasses, raised intersection platforms and driveway links were ranked least effective.

A good practice example of a device proven by many to be quite effective (a wombat crossing) is given below:

Table 3: Occurrence of traffic calming (LATM) devices used by councils

	Occurrence of devices (%)		
LATM device	**Commonly**	**Less often**	**Rarely or never**
Flat-topped road humps	25	26	49
Wombat crossings (as above with a pedestrian crossing)	14	23	63
Road humps (round profile)	18	33	49
Road (speed) cushions	11	18	71
Raised intersection pavements	9	23	68
Kerbside lane narrowings / kerb extensions	45	33	22
Slow points (angled or straight)	15	36	49
Blister islands	35	35	30
Driveway links	7	16	77
Median treatments	44	35	21
Roundabouts	61	27	12
Full road closure	7	29	64
Half / part / diagonal road closure	5	21	74
Modified T intersection	13	44	43
Speed limit signs	50	35	15
Prohibited traffic movement signs	16	47	37
One way, stop and giveway signs	66	26	8
Pedestrian (zebra) crossings	24	28	48
Perimeter threshold treatments	9	38	53
Tactile surface treatments	15	33	52
Bicycle lanes / bypasses	34	39	27
Bus only links / bus bypasses	3	13	84
Shared zones	4	24	72

Table 4: Ranking of effectiveness of traffic calming (LATM) devices (with 1 being least effective and 5 being most effective)

	Ranking of effectiveness (%)				
LATM device	**1**	**2**	**3**	**4**	**5**
Flat-topped road humps	11	13	18	43	15
Wombat crossings (as above with a pedestrian crossing)	17	10	17	37	19
Road humps (round profile)	12	11	33	31	13
Road (speed) cushions	14	16	31	29	10
Raised intersection pavements	21	8	36	29	6
Kerbside lane narrowings / kerb extensions	4	14	44	33	5
Slow points (angled or straight)	9	17	37	32	5
Blister islands	6	11	42	32	9
Driveway links	24	17	36	18	5
Median treatments	3	9	35	42	11
Roundabouts	3	6	9	39	43
Full road closure	10	10	16	29	35
Half / part / diagonal road closure	15	15	24	32	14
Modified T intersection	7	9	43	34	7
Speed limit signs	9	28	34	20	9
Prohibited traffic movement signs	8	28	46	14	4
One way, stop and giveway signs	3	12	38	33	14
Pedestrian (zebra) crossings	13	8	41	28	10
Perimeter threshold treatments	16	33	33	18	0
Tactile surface treatments	10	26	43	18	3
Bicycle lanes / bypasses	5	13	45	31	6
Bus only links / bus bypasses	26	15	40	16	3
Shared zones	13	22	36	28	1

Construction costs

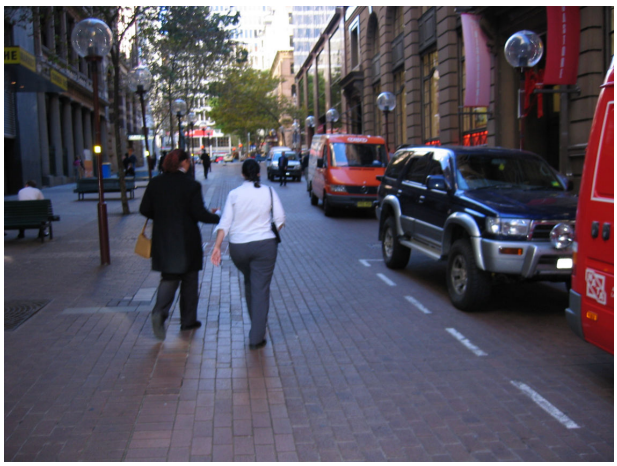
Costs for each device varied greatly as shown in Figure 1 (Appendix A). Numerous councils including the Shire of Broome (WA) and Port Augusta City Council (SA) commented that it was quite difficult to quote unit rate construction costs for these devices due to the number of variables involved in their construction. These include size and location of devices as well as the impact of

associated works such as drainage and service relocations.

The Launceston City Council in Tasmania stated that recently their costs for installing devices such as roundabouts had increased. This is due to the council using recycled rubber. This product has a higher initial cost but it is hoped to be outweighed by reduced maintenance and a lower life cycle cost.

Many traffic calming devices can be installed cheaply. However, additional complementary devices can add thousands to the costs. An example is marked pedestrian crossings. Paint and labour can cost as little as a few thousand dollars but when complemented by flashing warning lights and signs, the costs can rise to $30,000 or more (Banyule City Council, Vic).

A good practice example of a shared zone, which is typically quite an expensive treatment to install, is given below:



Traffic warrant system use

There are three broad categories of warrant system reported in the Austroads LATM guide – those being: a qualifying system, a priority ranking system, and an action/ threshold system. Approximately 80% of the respondents reported having some form of warrant system that they use as a decision support tool. Of these, 43% indicated they always use one of the three systems mentioned above, 30% indicated they use these warrant systems less frequently, and 7% exclusively use some other form of warrant system. Further breakdown of the results can be seen in Table 5.

Table 5: Frequency warrant systems are used always or sometimes by councils

	Frequency that warrant systems are used (always or sometimes) by Councils (%)
Priority ranking system	37
Qualifying system	29
Action / threshold system	26
Other	8

The most commonly used warrant system was stated as being the priority ranking system, with 37% of councils using this system always or sometimes. The other quoted warrant systems were less frequently used, with some councils choosing not to employ any warrant system at all. Corowa Shire Council (NSW) and Northern Midlands Council (Tas) are two councils that stated that they do not use any warrant system.

Some councils indicated that they use other processes in determining the need for traffic calming (LATM) devices. Maryborough City Council (Qld) uses the Queensland 'Manual on Uniform Traffic Control Devices' (MUTCD) whilst Campbelltown City Council in SA uses the 'Road Safety Risk Manager' for assessing whether devices are warranted.

Community complaints

The most commonly complained about device was the road hump, with 35% of respondents indicating their council had received complaints regarding this device (Table 6). This is nearly three times the amount of complaints attracted by the flat top road hump, which is the next most complained about device. The biggest reason given for complaints was noise. Randwick City Council (NSW), Shire of Broome (WA), Whangarei District Council (NZ), and Maroochy Shire Council (Qld) are just a few of the 25 surveyed councils to have received noise complaints on road humps. Councils such as Moonee Valley (Vic) have also

received complaints with respect to road humps in relation to them causing vehicle damage. This is interesting considering that Bendtsen and Larson (2001) report that road humps are generally found to reduce noise in a street other than immediately before and after a device, where noise does increase.

Many devices appear to attract very little or no complaint. Such devices include shared zones, tactile surface treatments and half / part / diagonal road closures. This outcome is quite surprising as it is counterintuitive.

Table 6: Most commonly complained about LATM device

	Number of complaints (%)
LATM device	
Road humps (round profile)	35
Flat-top road humps	12
Roundabouts	8
Speed limit signs	6
Modified T intersection	5
Pedestrian (zebra) crossings	5
Slow points (angled or straight)	5
Full road closure	4
Kerbside lane narrowings / kerb extensions	4
Blister islands	3
Road (speed) cushions	3
Wombat crossings	3
One way, stop and giveway signs	2
Prohibited traffic movement signs	2
Driveway links	1
Median treatments	1
Raised intersection pavements	1
Bicycle lanes / bypasses	0
Bus only links / bus bypasses	0
Half / part / diagonal road closure	0
Perimeter threshold treatments	0
Shared zones	0
Tactile surface treatments	0

'Road humps', which were the most complained about traffic calming device, were also reported as being the most frequently removed device with twenty councils reporting this outcome. Two other commonly removed devices are the 'marked pedestrian crossing' and 'speed limit signs' with eighteen respondents for each indicating removal of these devices.

All listed devices were reported as having been removed by at least one of the responding councils. However, driveway links, bus only links and shared zones were only reported as being removed by one Council each. This could be attributed to few councils installing these devices (refer to Table 3) relative to other devices. These devices also had no complaints received against them.

A good practice example of a road hump is given below:

Post construction monitoring

The most measured parameter post device construction is traffic volumes (see Table 7). This was closely followed by speed surveys with 56% of councils indicating they always measure this parameter.

Although post construction monitoring appears to be a common practice not all councils participate. For example, one metropolitan council in South Australia indicated that they have little or no time for reviews so often no post construction monitoring takes place.

Table 7: Frequency of parameters measured on post construction monitoring

	Frequency parameter measured (%)		
Parameter	**Always**	**Sometimes**	**Never**
Speed surveys	56	40	4
Crash analysis	40	48	12
Traffic volumes	59	37	4
Origin and destination surveys	6	40	54
Residential / Public attitudes	27	64	9
Effects upon and responses from specific road users	24	65	11
Other	19	25	56

Placing and spacing of devices

A vast majority of the respondents (81%) stated that they predominantly use the Australian Standard AS1742.13 (1991) requirements for determining how the placing and spacing of LATM devices is determined (Table 8). A similar number of respondents said that they also predominantly use speed based design principles and/or base spacing and placement on community requirements. Please note that Councils may use more than one system.

Table 8: Criteria used for determining the placement and spacing of LATM devices

Criteria for devices	**Response Percent (%)**
Australian standard requirements	81
Speed based design principle	63
Based on community requirements	61
Based on political pressure/guidance	44
Other (please specify)	17

A number of alternative responses were given for determining the placement of LATM devices. The councils of Mundaring and Belmont (WA) both stated that they determine their placing and spacing of devices on the environment and environmental concerns. Rodney District Council (NZ), Bankstown City Council (NSW) and Adelaide Hills Council (SA) all indicated that they primarily use local judgement.

Discussion

It is quite evident that the application of traffic calming is quite varied throughout Australia and New Zealand. Traffic calming is also approached quite differently depending on whether a Council is largely metropolitan, regional or rural in nature. This is quite logical as the traffic issues facing different Councils are both varied and complex.

A common response received throughout the research was that small rural towns do not see traffic calming, and in particular physical LATM devices, as relevant to their needs. This is demonstrated by the Sarina Shire Council (Qld), which indicated that funding traffic calming devices is generally seen as unwarranted. Ballone Shire Council (Qld) also indicated that LATM is not really considered relevant to their small, remote, community circumstances. Similar responses were obtained from other Councils in a similar situation.

The rural city of Wangaratta in Victoria indicated that their traffic problems are generally not focussed on one particular location. Therefore instead of installing costly devices they utilise police to ‘move on’ the problem. However, the Gold Coast City Council in Queensland has taken the opposite approach. They state that little enforcement of speeding and hooning is done by police. The police actively deflect residents onto the Council saying it is a council issue and traffic calming devices should be installed.

Whangarei District Council (NZ) commented that LATM is a subject that some people fully support whilst others do not want to see any devices installed at all. Leichhardt Council

(NSW) indicated that it is the vocal residents who always win.

Conclusion

All of the variation in practice identified throughout the research reinforces how very difficult it is to benchmark best practice in the field of traffic calming. There are close to 700 local government authorities in Australia alone and what applies well in one local government area may not apply as well in another. The issues are complex and sensitive to community pressures.

This is one of the main reasons why it is so important for practitioners to share their experiences gained both through their successes and failures – to benefit the rest of the profession and to provide a basis for the next generation of practitioners to learn and benefit from.

That aside, it is clear that many current Australian and New Zealand practitioners have a reasonably good understanding of local area traffic management practice and are routinely applying their knowledge to the application of the science.

References

Damen, P., Brindle, R. & Gan, C. (2004). The Austroads Guide to Traffic Engineering Practice Part 10 – Local Area Traffic Management, Austroads Inc., Sydney, Australia, pp. 158.

The Transportation Association of Canada. (1998). Canadian Guide to Neighbourhood Traffic Calming, Transportation Association of Canada, Ottawa, Canada.

Standards Australia, Road Signs and Traffic Signals. (1991). Australian Standard AS1742.13-1991, Manual of uniform traffic control devices, Part 13: Local area traffic management, Standards Australia, Sydney, Australia, pp. 44.

Bendtsen, H. and Larson, L. (2001). Noise by humps on roads, Denmark Transport Forskning, Lyngby, Denmark.

Acknowledgements

I would like to acknowledge the contribution of Hannes Hoeffler who provided invaluable assistance in the delivery of the research.

I would also like to acknowledge the support of all those Councils (numbering more than 150) that responded to our request for information. Due to the input of so many we have been able to confidently draw conclusions relating to a range of different research outcomes.

Appendix A

Figure 1: Relative traffic calming (LATM) device construction costs

Local Area Traffic Management Device	Construction Cost (2007 AUD$)	Comparison Chart
Road humps (round profile)	800 - 10,000	
Flat-topped road humps	3,000 - 20,000	
Wombat crossings	3,000 - 30,000	
Road cushions	1,000 - 10,000	
Raised intersection pavements	8,000 - 50,000	
Kerbside lane narrowings / kerb extensions - per 100 m	2,500 - 50,000	
Slow points (angled or straight)	2,000 - 40,000	
Blister islands	1,000 - 30,000	
Driveway links - per 100 m	3,000 - 60,000	
Median treatments - per 100 m	500 - 50,000	
Roundabouts	5,000 - 400,000	
Full road closure	500 - 50,000	
Half / part / diagonal road closure	1,500 - 50,000	
Modified “T” intersection	5,000 - 250,000	
Pedestrian crossings	500 - 50,000	
Perimeter threshold treatments	1,000 - 45,000	
Tactile surface treatments - per 100 m	1,000 - 25,000	
Bicycle lanes / bypasses - per 100 m	500 - 25,000	
Bus only links / bus bypasses - per 100 m	1,000 - 100,000	
Shared zones - per 100 m	1,000 - 15,000