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TRAFFIC CALMING: PROGRESS AND POTENTIAL

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INTRODUCTION

Increasing motorisation of urban travel brings with it heavy social costs and degradation of our living environment. Freedom of mobility conferred by the car has reduced as car use has spread, while freedom to use urban spaces for activities other than driving has been severely eroded. The congestion, noise, dirt, danger and ugliness brought about by motor traffic now makes it essential for traditional urban centres to take counter-action in order to retain their viability. Centres failing to improve their environment will decline in the face of competition from car-dependent developments such as out-of-town "retail parks" and spacious "business parks". These trends are forcing a rethink of urban planning priorities and techniques throughout Europe.

This paper first outlines the new counter strategy that is required, and the contribution of traffic calming to its achievement. Second, the potential of traffic calming as a solution for environmental, safety and local economic problems is discussed, and third, progress in the UK is reviewed, with suggestions for future action.

SCENARIO FOR TRAFFIC-CALMED TOWNS

Towns and cities face an uncertain future in the face of the rising tide of motor vehicles. Some argue that unless car access is improved, people and commerce will be driven away to places with more generous road and parking facilities. Others argue that it is precisely the attempts to accommodate motor traffic that have driven people away from traditional urban centres. As it has become clear that full motorisation is impossible, the latter view is gaining ground. Authorities throughout Europe are taking action to tackle the multiple problems of urban areas, including the domination of motor vehicles, and to promote a rejuvenation of traditional urban centres.

A town-friendly strategy must of course consist of more than isolated traffic and transport policies. These must be developed alongside programmes for housing renovation, employment generation, conservation of historic areas, promotion of civic culture and the arts, play and recreation, child care, special

needs, health and education, and other physical and social infrastructure. And all of this requires healthy systems of government for progress to be made.

The transport contribution to urban rejuvenation means emphasising access rather than mobility, and reducing the adverse impact of motorised travel on the quality of urban life. Much can be done to civilise the motor vehicle, and this is the essential task of traffic calming, but the potential is inversely proportional to the volume of moving and parked motor vehicles in the town. Ultimately both will have to be reduced.

Meanwhile, a growing consensus that traffic growth must be limited is hardly matched by any coherent set of ideas as to how it might be achieved. A programme of road expansion costing upwards of £15 billion is underway encouraging traffic growth rates which cannot possibly be shared within urban areas. Attention will need to be paid to the fact almost all trips start and end within urban areas. As urban traffic growth is limited (both by policy and by congestion) we are seeing the emergence of a nation divided by transport policy. On the one side urban areas with no possibility and no intention of pursuing full motorisation, and on the other the rapidly-growing car dependent developments outside established centres - recently referred to by the Countryside Commission as an "emerging National Milton Keynes".

Assuming that these broader contradictions are eventually addressed, what kind of "pro-city" strategy is required, and how does traffic calming fit in? Topp (Ref. 1) has identified three elements to what he calls "urban compatible traffic planning", shown in Table 1.

TABLE 1 Strategy for Town-Friendly Traffic Planning

1. Limiting or reducing the amount of motorised travel.
2. Shifting traffic to transport modes which preserve the environment and save energy.
3. Creating urban compatible layouts and designs of the traffic systems themselves.

Source: Topp, H (Ref. 1)

The first element challenges the value of increased travel. A large proportion of traffic growth is due to longer journeys rather than new journeys, and this is unsustainable in view of the social and environmental costs incurred.

The second element is concerned with reducing the proportion of journeys made by car. The other principal explanation for traffic growth is the switch of travel mode from walk, cycle and public transport to car. There is no firm evidence that trips have increased.

Traffic calming is concerned with the third element, namely

civilising the presence of motor vehicles - both moving and parked - in built up areas. Traffic calming, or "traffic integration", is essentially about re-ordering priorities in streets and other public spaces to encourage their role as living space rather than merely tentacles of the traffic network.

There are three basic components of traffic calming technique as shown in Table 2. These are the Reduction of vehicle speeds and the fostering of a steady driving style; the Reallocation of carriageway to space for street activities (play, planting, walking, stopping, resting, parking, loading, cycling etc); and Redesigning the street and its furniture to encourage the new priorities, to bring about improved appearance, and to create better environmental conditions.

TABLE 2. The Three Rs of Traffic Calming

- R REDUCED SPEED and calm driving
- R REALLOCATED SPACE from carriageway to non-traffic uses
- R REDESIGNED STREET SPACE for better environment, and to reinforce the change of priority.

Traffic calming is distinguished from more conventional techniques by its central concern with speed and driver behaviour rather than traffic flows and capacity, and with local access rather than movement. The conventional approach to environmental and safety improvement, as advocated for example in Buchanan's "Traffic in Towns" report of 1963 (Ref. 2), relied on traffic segregation in the belief that motor traffic is inherently incompatible with street life and with the weaker traffic participants (pedestrians and cyclists). Traffic calming, by contrast, recognises that motor traffic, up to a point, can be compatible with urban life. The key to achieving this is slow speeds and steady driving styles.

Traffic Calming guidelines produced by Devon County Council (ref. 3) describe 19 different measures that can be taken to moderate driver behaviour and to exploit the potential for safety and environmental improvement. The choice and combination of measures must, however, be determined in relation to the particular circumstances of the scheme, and the specific objectives which it is intended to serve. The most popular and effective schemes have been those which tackle multiple objectives using an integrated design.

Traffic calming may therefore be seen as part of a continuum in which conventional and modern techniques are integrated to meet a wide range of objectives. "Speed Management" takes over from "Traffic Management" as the central engineering technique which allows safety, environmental and other benefits to be achieved. The Speed Management framework advocated for Devon County Council is shown in Diagram 1, whilst an example of this framework applied to a hypothetical town is shown in Diagram 2. What is

DIAGRAM 1 Speed management framework in Devon (Ref 3)

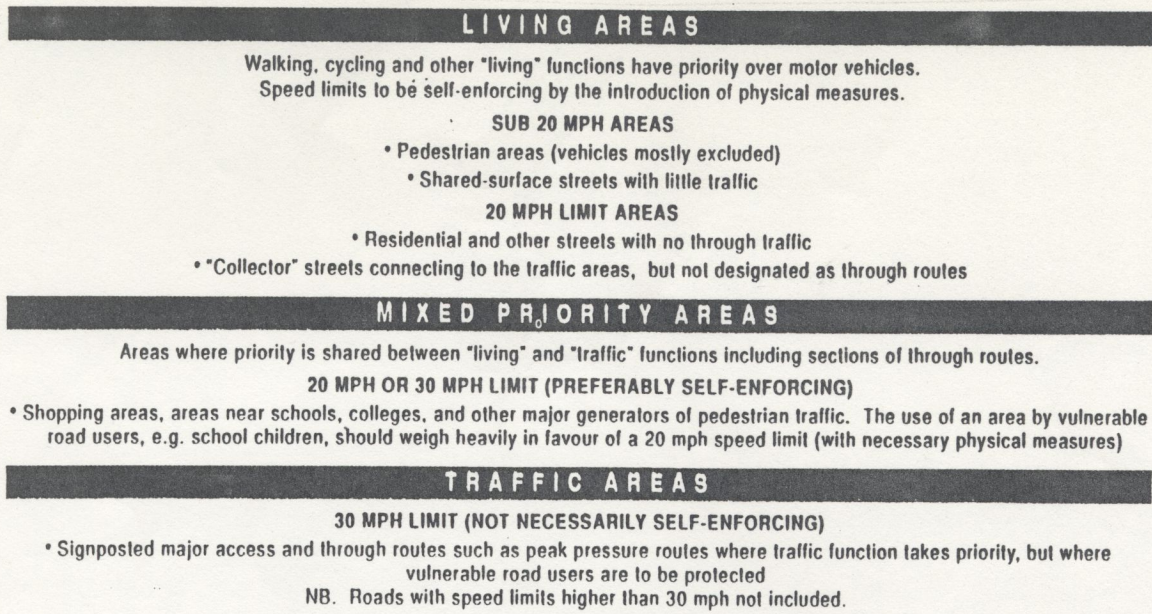
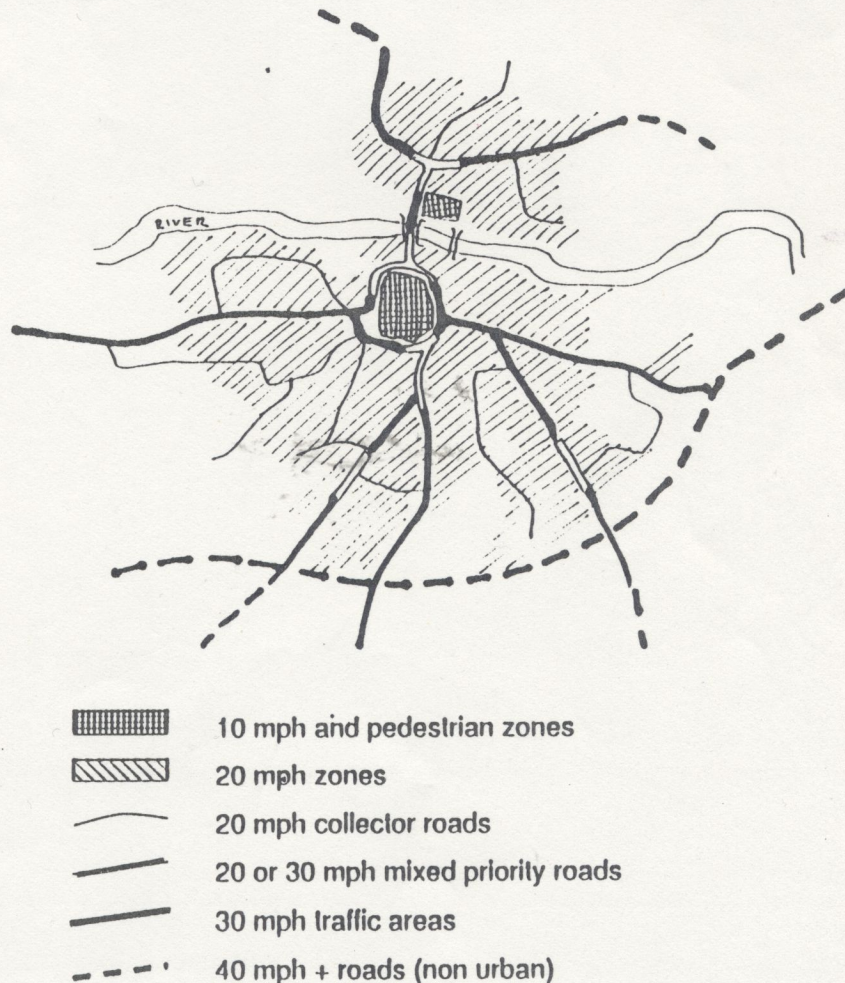


DIAGRAM 2. Example of speed management framework



implied in such a model of a traffic-calmed town?

Within the main built-up areas the maximum vehicle speed will be 20 mph (30 kmph) or less, achieved by a combination of self-enforcing measures. The exception will be designated through routes which will have a general limit of 30 mph, though this limit will be reduced to 20 mph where such roads pass shopping areas, schools, hospitals and other important pedestrian generators.

Pedestrians will have large areas of the town and suburban centres given over for their exclusive use, and will also have considerable freedom to cross roads at will within the 20 mph areas. On main roads they will be provided with protected crossing facilities. Cyclists will also have freedom within 20 mph areas, and their movement along the main corridors will be provided for by a network of safe routes including separate cycle paths.

Public transport services will be provided on routes that are protected from the disruptive effects of traffic congestion, and exempt from severe speed or route restrictions.

THE POTENTIAL OF TRAFFIC CALMING

The potential benefits of such a traffic calming strategy are summarised in Table 3, and the next section of this paper discusses each of these in turn.

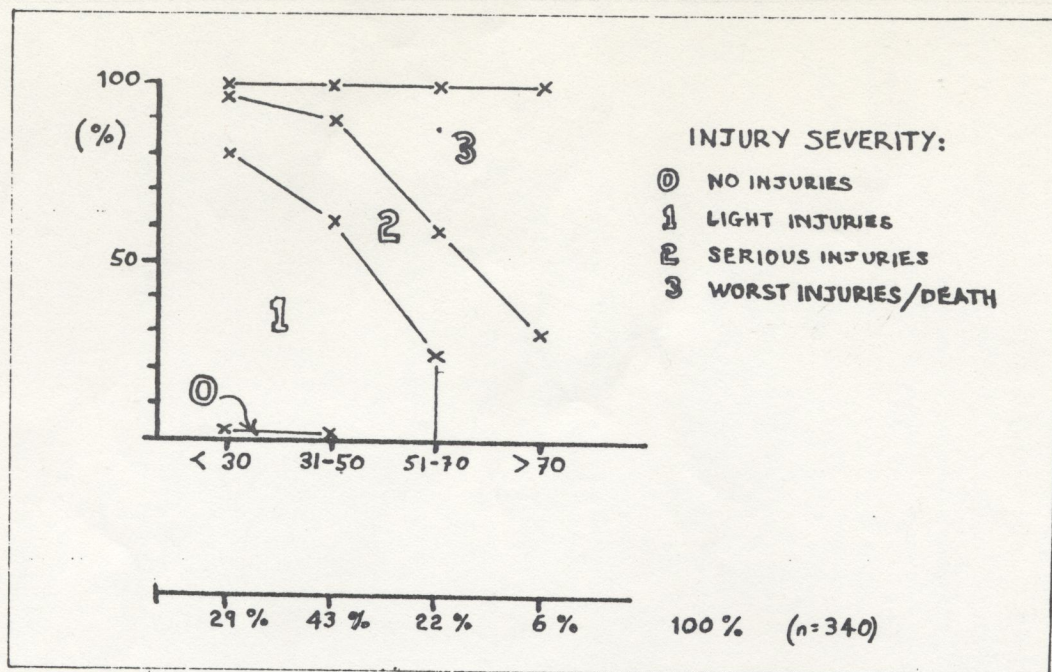
TABLE 3 The Benefits and Objectives of Traffic Calming

1. CASUALTY REDUCTION
2. MORE SAFETY
3. LESS NOISE AND AIR POLLUTION
4. BETTER LOCAL ACCESS
5. MORE ATTRACTIVE AND USEFUL PUBLIC SPACE
6. MORE BUOYANT LOCAL ECONOMIC ACTIVITY

Casualty reduction

The British government has set a target for a reduction of one third of road casualties by the year 2000 (one third reduction from the 1987 level). There is also an intention to place higher priority on severe and fatal injuries, and on casualties amongst the vulnerable road users (pedestrians, cyclists, children, elderly). In view of the direct relationship between speed of impact and severity of injury (see Diag. 3), traffic calming offers great potential for casualty savings, and indeed this has been demonstrated in studies of traffic calming measures in several European countries over the past 10-15 years.

DIAGRAM 3 Speed and pedestrian injury severity (Ref. 4)



Results from two major Dutch demonstration projects showed casualty reductions of 44% in residential areas and 20% overall. The West German 30 kmph zones also show reductions of 44%, even though many of these zones have no self-enforcing measures. The most impressive results so far have come from a study of 729 streets in Denmark where traffic calming measures have produced a casualty rate reduction of 72% (78% for serious injuries) (Ref 5).

Given favourable assumptions about traffic growth and progress of traffic calming schemes, a reduction of 50% of fatal and serious injury accidents may be expected where traffic speeds are reduced to below 20 mph in built-up areas. In the UK context this would contribute roughly a one third reduction of fatal and serious injuries. Experience suggests that slight injuries are less likely to be reduced by such measures, so the reduction of total casualties be no more than 10%.

The importance of area-wide traffic calming and traffic management for residential areas is underlined by the fact that they account for roughly two thirds of child pedestrian accidents. Although the general accident rate in the UK compares favourably with most other European countries, the pedestrian accident record is less good. Jones, in an article in the 1989 Casualty Report (Ref. 6, page 36), writes that "the rate per 100,000 population of child pedestrians killed on our roads is one of the worst in Europe." It is this which has prompted the area-wide approach as advocated in the UK Urban Road Safety Projects. Although not strictly traffic calming, the demonstration projects had some success in reducing rat-run traffic and other traffic conflicts, and casualties by 13% (Ref. 7, page 104).

From before and after studies of traffic calming schemes in residential areas, it is usual to find that vulnerable road user groups are the main beneficiaries. For example, child injuries in the Berlin Moabit scheme were reduced by 66%.

More Safety

The relationship between accidents and safety is poorly understood. It is erroneous, however, to regard low accident numbers as being synonymous with a safe traffic environment, and particularly so for pedestrians in urban streets. Appleyard demonstrated in his study of San Francisco (Ref. 8) that frequency of crossing the road is affected by the intensity of motor traffic. It is therefore possible to describe roads which are so heavily trafficked that no one dares cross them. In this case extreme danger produces an excellent accident record. There is also a trade-off to be made between safety and convenience. Guard rails and pelican crossings, pedestrian bridges and subways may reduce accidents, but only at the cost of inconvenience for pedestrians.

Traffic calming should therefore be concerned not just with casualty reduction but with making streets safer and more convenient to use. Reported casualty reductions reported may imply even greater reductions in the casualty rate, where the schemes have resulted in greater intensities of pedestrian and cycle activity. For example, accident reductions in the Berlin Moabit area-wide scheme of 43% for pedestrians and 16% for cyclists must be seen in the context of increases in pedestrian and cyclist activity of 27 - 114%.

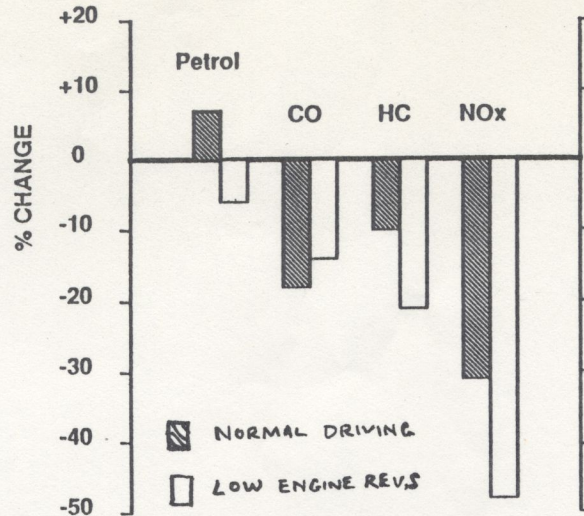
Traffic calming must therefore be judged not only on casualty reduction but also on the extent to which pedestrian and cycling activity increases as a result of safer and more pleasant conditions.

Less Noise and Air Pollution

Road traffic is the most common source of urban noise nuisance. A reduction of traffic speeds from about 35 mph to 20 mph will reduce noise by 3 - 5 dBA, which is roughly equivalent to the noise reduction achieved by a halving of traffic volume. The best noise reduction results require the achievement of steady driving (minimum braking and acceleration), and the use of paving materials which do not produce increased noise from wheels.

Research into the effect of speed reduction on exhaust emissions as part of the evaluation of the Buxtehude traffic calming project in Germany found that all types of air pollutants can be reduced when speeds are brought down to around 20 mph, especially when "minimum acceleration" driving styles are adopted (see Diag 4). Petrol consumption, however, may increase at 20 mph unless third gear (low engine revolutions) is selected. Slower driving speeds can therefore improve local air quality, but it must be remembered that only a small proportion of national vehicle miles travelled is likely to be driven at 20 mph, even when the "traffic calming vision" is fully implemented.

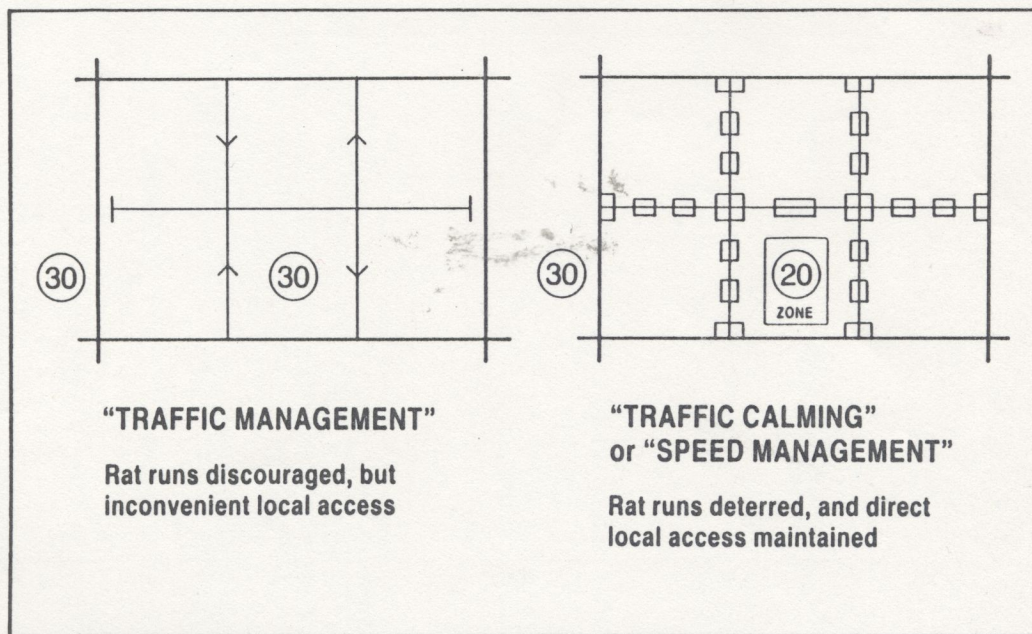
DIAGRAM 4. Exhaust emissions, petrol consumption and speed.



More Convenient Local Access

Rat run traffic in residential areas can be reduced by the introduction of self-enforcing speed reduction measures rather than by physical closures and banned movements, as illustrated in Diag. 5.

DIAGRAM. 5 "Speed Management" and "Traffic Management"



The "traffic management" approach seeks to remove through traffic (rat runs) in order to secure safety and environmental improvements. However, all traffic causes problems, not just through traffic, and the removal of through traffic can even increase the dangers by increasing the speed of the remaining traffic. A further problem is that closures and one-way streets require local traffic to take a less direct route, thus increasing vehicle miles and in effect giving priority to through traffic rather than local access traffic. The "speed management" approach avoids these problems by retaining direct and convenient access, and discouraging through traffic by slow speeds which apply to all categories of journey.

More attractive and Useful Public Space

Lower driving speeds require less carriageway width, and many urban streets have been laid out with over-generous dimensions which encourage speeding. In most streets there is scope to convert carriageway space to one or more of the following:

- larger footways and pedestrian areas
- cycle paths and parking
- planted areas
- parking and loading bays
- play areas
- seating and street furniture

Such measures make the street more "livable" and attractive, and this is important in getting public acceptance for the speed reduction measures.

More Buoyant Local Economic Activity

It is well known that the majority of retail businesses benefit from being located in traffic-free areas. Edward Erdman & Partners have demonstrated that prime retail rents are significantly higher in traffic-free areas. According to their studies rents in pedestrian streets were 45% higher than in vehicular streets in 1987, and 80% higher in 1989 (Ref. 9).

By the same token, traffic calming schemes which improve the pedestrian environment and reduce the noise, danger and dirt of motor traffic are likely to result in increased trade for businesses located in such areas. Table 4 shows that in all but one of the 6 Federal German area-wide demonstration projects trade showed improvement after the introduction of the traffic calming measures (Ref. 10, page 26).

Broader studies in Germany of the relationship between car use and economic performance have also yielded interesting results. A study by the Deutches Institut fur Urbanistik tested the view of the Federal Association of Medium and Large Firms of the Retail Trade that "parking is extremely important for trade". Their study of 37 German towns and cities "could find no evidence which confirmed this opinion. Indeed, evaluation of the available evidence has rather made the opposite clear: a positive development impulse for the inner city can be expected not by

enlarging parking provision, but by a transport policy which favours the more city-friendly modes of travel" (Ref. 11, page 71).

TABLE 4. Changes in business turnover in Six German Traffic Calmed Areas (before and after)

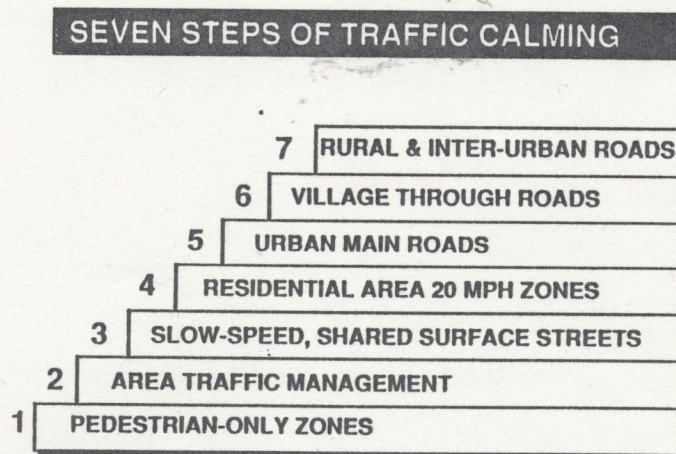
<u>% OF BUSINESSES</u>	<u>DECREASED</u>	<u>NO CHANGE</u>	<u>INCREASED</u>
Berlin Moabit	31.3	40.4	28.3
Borgentreich	0.0	60.7	39.3
Buxtehude	6.0	33.7	60.3
Esslingen	20.5	31.1	32.5
Ingolstadt	18.4	38.8	42.7
Mainz	28.6	30.6	34.7

Source: Kanzlerski, D. (Ref. 10 page 26)

UK TRAFFIC CALMING: HOW FAR HAVE WE GOT?

The development of traffic calming practice has followed a series of steps that can be identified in several countries, notably Denmark, Germany and the Netherlands. Although coming much later than these countries on the scene, and still with relatively few schemes implemented, the UK has followed similar steps. These are shown in Diag 6 and represent a rough chronology of traffic calming development.

DIAGRAM. 6 Seven steps of traffic calming



Pedestrianisation of shopping streets (Step 1) was perhaps the earliest measure aimed at avoiding the adverse impact of traffic. The UK has tended to rely on purpose-built pedestrian malls and arcades, whereas other European countries have more commonly created pedestrian zones out of former traffic streets.

Environmental traffic management (Step 2) was also based on the idea of segregating traffic, and relied on the definition of a hierarchy of traffic networks. There are many examples, the earliest in Pimlico dating from 1967, and this approach is still advocated in the UK through the Urban Safety Management Guidelines (Ref 7).

Slow-speed, shared-surface (Woonerf) schemes (Step 3) were developed for quiet residential areas in the Netherlands and became the dominant technique during the 1970s in many European countries. UK towns, with very few exceptions, have skipped this Step, unless one includes the "mews court" housing developments of the 1980s. An internationally agreed sign to denote such areas has not been adopted in the UK because there are no traffic regulations to which it could apply.

On mainland Europe in the 1980s, 20 mph (30 kmph) zones (Step 4) replaced the Woonerf as the main traffic calming technique, with large parts of German and Dutch towns now subject to the lower speed limit. The first 20 mph zone regulations in England and Wales were issued in 1990. Although humps and other speed control measures have been installed in many residential areas, by the middle of 1991 only four 20 mph zones had been designated.

The search for bigger casualty reductions and economic regeneration opportunities means that main road traffic calming (Step 5) should provide the main focus of attention in the 1990s. One of the most radical schemes yet implemented is to be found in Borehamwood, Hertfordshire, where speed control ramps have been installed on an A class road carrying 18,000 vehicles a day including buses and heavy goods vehicles. But there remains a widespread reluctance to enforce slow speeds on main roads using vertical shifts in the carriageway. The London "red route" schemes, despite other benefits, have increased traffic speeds.

Most villages will never get a by-pass, and even where one is provided it is no guarantee of safer and better conditions on the former through route. A recent study of East Grinstead, for example, suggested that the proposed by-pass would be irrelevant to 75% of existing traffic (Ref Roberts 1991). Increasingly, therefore, traffic calming techniques are being applied in villages (Step 6). The Department of Transport is promoting demonstration projects in six towns as part of its Trunk Road by-pass programme, while several County Councils have established programmes including Devon, Dorset, Hertfordshire and Kent.

Traffic calming in built-up areas still leaves considerable problems on roads in non built-up areas, including a quarter of all road casualties in the UK. Accidents to pedestrians and cyclists on rural roads are also more severe than on urban roads. So far traffic calming techniques have rarely been applied

outside urban areas (Step 7). On motorways, the debate as to the most appropriate speed limit rages on in almost every country. The UK government has this year rightly decided not to raise the 70 mph limit, but lower limits can be enforced, as demonstrated on many USA freeways. Meanwhile, this seventh step towards comprehensive traffic calming remains to be climbed.

WHERE DO WE GO FROM HERE?

There are advantages to not being first in the field, in that one can learn from others' experience. In the UK, therefore, we have been able to avoid the rather costly excesses of the early "shared space" developments which, though sometimes impressive in themselves, never offered more than a very limited and localised solution. The new 20 mph zone regulations also insist on the lower speeds being self-enforcing through sufficient physical measures. This seems to be a sensible response to the rather poor performance of "legal limit" only schemes tried in other European countries.

Nevertheless, too little progress has been made in the UK to date, and progress is still hindered by an unnecessarily cautious and penny-pinching approach. Problems for the future of traffic calming in the UK lie in two main areas: the relationship between central and local government, and funding.

The Department of Transport has said that local authority traffic calming schemes will be welcomed and evaluated in order to provide future advice and guidance on the best practice. Yet many local authorities are reluctant to introduce engineering features which do not conform to existing regulations, for fear of prosecution should an accident occur. For some this fear has reached the level of paranoia since an unfortunate fatality which occurred on non-standard speed control measures in the New Forest in 1990. We thus have a self-reinforcing absurdity, whereby attempts to establish safer road engineering practice are prevented by adherence to centrally-determined regulations that are, de facto, seen as inadequate to address the problems.

There is concern also that the present 20 mph zone regulations (Ref 12) will prove to be too complex and time consuming to allow rapid implementation of the lower limit.

After three attempts, and the passage of more than 17 years since the first investigations by the Transport and Road Research Laboratory (Ref. 13) the regulations governing speed humps are still unsatisfactory. The justification for insisting on strict engineering regulations which produce ugly schemes of dubious effectiveness is obscure. An evaluation of the research into hump and ramp design already undertaken in many countries is long overdue.

The second problem is that of funding. Some local authorities have set aside specific traffic calming budgets, though none are of sufficient scale to achieve the "scenario of traffic calmed towns" by the end of the century. There are other budgets that can be and are used, for example housing improvement, environment

enhancement, urban programme, road safety and road maintenance. But given the tight restrictions on local finance, central funds will need to be diverted on a much larger scale to kick-start traffic calming policy. Most Government money for roads is spent on capacity provision. The "urban compatible" strategy outlined at the start of this paper means a change of priorities, and this ultimately means switching expenditure from road capacity to traffic calming, from inter-urban to local programmes, and from roads to public transport and cycle provision. The Department of Transport has now broadened the categories of local scheme that can be submitted for grant funding, including safety measures on local roads, and this is a step in the right direction. More encouragement is also needed for local authorities to implement traffic calming schemes that meet environmental as well as accident reduction objectives.

CONCLUSION

Traffic calming, like any other new policy, requires political willingness to act, and this depends on public pressure and acceptance. In Bavaria I was told "no Mayor can be against traffic calming without risk of being voted out next time". In the UK also, public opinion is compelling authorities to act and in some areas is running ahead of local authorities' ability to respond.

There is an urgent need to encourage a change of attitude towards speed. In the phrase used in a Friends of the Earth campaign, "speed kills". Attempts to promote safety consciousness and compliance with speed limits are constantly undermined by car advertising. Car design is also at odds with safety objectives, with almost all models on sale capable of speeds well in excess of what is legal, and a performance which is incompatible with safe urban driving. A major shift in attitudes is essential for traffic calming policy to be fully effective. That such major changes in attitude can be achieved has been demonstrated by the popularity of 20 mph zones, and on a broader level by the success of the drink-drive campaign. Speed is the next frontier to be conquered, and the quicker the better!

Finally, traffic calming is about changed priorities. Real progress will be hampered until money, planning and promotion are shifted away from conventional practice to develop the new approach.

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