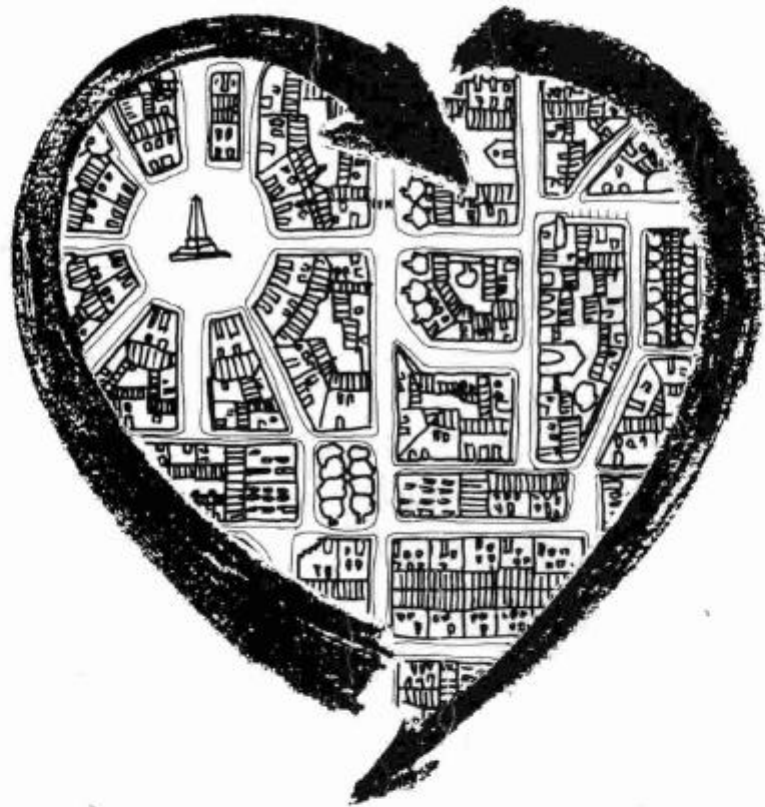


VIVRE ET  
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EN VILLE

LIVING AND  
MOVING  
IN CITIES



ACTES DU  
CONGRÈS

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# **LA GESTION DE VITESSE, LA SÉCURITÉ ROUTIÈRE ET LA MODÉRATION DE LA CIRCULATION: CONTRADICTIONS DU CADRE POLITIQUE. SPEED MANAGEMENT, ROAD SAFETY AND TRAFFIC CALMING: CONTRADICTIONS IN THE POLICY FRAMEWORK.**

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*The safety and environmental benefits of slower speeds have been demonstrated. Physical traffic calming measures can achieve these in ways which are popular and affordable. A speed management strategy, it is suggested, should be based on a speed classification of roads not simply on notional traffic hierarchies. The area-wide approach to defining traffic hierarchies is also questioned in congested urban conditions where it provokes public hostility and makes implementation of traffic calming more difficult. An alternative speed management approach in London is described. To be fully effective, speed management and traffic calming require the overhaul of road design standards and guidelines. On main roads a willingness to use sufficiently severe measures to reduce speeds is needed. Radical changes are also needed to limit the production and promotion of cars which have a performance better suited to the race track than to public roads. Britain has as yet taken only hesitant steps towards traffic calming and lacks a policy framework. However, interest is growing amongst local authorities and ways must be found to foster initiative and innovation.*

La sécurité et les bénéfices environnementaux des vitesses réduites ont été démontrées. Les moyens physiques pour modérer la circulation peuvent obtenir ces résultats de façon populaire et peu coûteuse. Une stratégie de gestion de vitesse devrait être basée sur une classification de vitesse des voies routières non pas seulement sur des hiérarchies spéculatives de volumes de circulation. La méthode pour définir des hiérarchies de circulation sur une base territoriale, devrait également être contestée dans le cas de zones urbaines encombrées ou elle incite l'hostilité et rend plus difficile la mise en place de oeuvres de modération de la circulation. On décrit un moyen alternatif de gestion de vitesse dedans Londres. Pour être efficaces, la gestion de vitesse et la modération de la circulation exigent la révision des normes de design de la voirie. Il faut être incliné d'employer des moyens d'une severité suffisante pour modérer la vitesse sur les voies majeure. Des mesures radicales sont également nécessaires pour limiter la fabrication et la promotion des voitures dont la performance convient d'avantage au champ de course qu'aux voies publiques. La Grande Bretagne n'a jusqu'à présent fait que quelques pas hésitants dans la direction de la modération de la circulation. Cependant, les autorités locales montrent un intérêt croissant.

## DEFINITION AND OBJECTIVES OF TRAFFIC CALMING

Traffic calming schemes are associated with a rich variety of policy objectives. Traffic calming is therefore capable of diverse definitions and an accepted definition has yet to emerge.

We therefore state a working definition which we believe can serve as a common denominator and apply to most schemes. The main concern is with the achievement of calm and safe conditions on streets, but given the strong association, in much Continental practice at least, with environmental improvements, it seems appropriate and necessary for the definition to encompass this.

Accordingly traffic calming may be defined as "the attempt to achieve calm, safe and environmentally improved conditions on streets".

In adopting this definition, it must be acknowledged that there are traffic calming schemes which are almost entirely concerned with improving road safety and for which environmental factors are incidental. An example would be simple schemes involving a few speed control humps, such as are becoming more numerous in the UK.

Even so, if a slower driving speed is achieved there are likely to be marginal reductions of noise and pollution, and it should be remembered that in Continental usage the term environment usually embraces the social as well as the physical environment. Since social environmental gains are associated with perceptions of safety in even these simplest of schemes it seems entirely appropriate that environmental improvements enter into any definition of traffic calming. This would apply even if traffic calming were extended to embrace schemes on motorways and similar roads, where the means of inducing calm driving is principally enforcement. Such an extension is logical unless traffic calming is also linked to the use of self-enforcing, road engineering measures; this link is the common perception and it is assumed in the discussion here.

The main goals of traffic calming are seen as fivefold:

- (1) to improve road safety;
- (2) to reclaim space (from the carriageway) for pedestrians and "non-traffic" activities;
- (3) to improve pedestrian mobility and reduce

traffic barrier effects;

- (4) to promote greater feelings of security, particularly among residents, pedestrians and cyclists;

- (5) to create environmental improvements.

Implicit in traffic calming is a shift in priorities to redress the balance in favour of the pedestrian (and cyclist) vis a vis motor vehicles. Traffic calming does not necessarily imply any overall reduction in traffic volumes, however. Although schemes may and do often constitute elements within wider traffic restraint policies, there are also many schemes where no reduction of traffic is intended.

Confusion can arise in discussions of the role of traffic calming in traffic reduction. If speed reductions are achieved locally on one street or within an area by traffic calming measures, this may divert traffic onto alternative routes, or may be sufficient to reduce total traffic. Such local reductions in traffic are unlikely to have a significant impact on the level of traffic overall, unless combined with a comprehensive traffic restraint policy, though they may succeed in containing future traffic growth. This distinction is important to clarity of analysis, and it is for this reason that definitions of traffic calming implying traffic reduction are resisted.

The main goals of traffic calming identified above generally involve several component objectives. The importance of these objectives will vary from scheme to scheme, just as the emphasis among the main goals shifts with the nature of the scheme. The concern in this paper is with the first of these goals, road safety. Casualty reduction and accident reduction are component objectives of road safety, with casualty reduction often broken down into the reduction of casualty numbers and the reduction of their severity. Certain categories may also be specifically targeted for reduction such as pedestrian, cyclist or child casualties. Criteria for scheme evaluation then inevitably centre on individual component objectives and performance measures rather than on aggregate goals. Priorities between component objectives need to be made clear, therefore, prior to scheme design.

## SPEED AND ROAD SAFETY

Road casualties are known to be due to vehicle speed. The relationship between speed and road safety is fundamental and obvious. At its most trivial level zero speed would mean no accidents. As speeds rise the laws of physics apply. Increased speeds mean increased braking distances means increased risk of collisions and increased seriousness in the consequences of the collisions which occur. The greater the speed the greater the momentum on impact and the greater the risk of and severity of injuries which result, with fatalities proportional to the third or fourth power of the speed.

Speed, when defined as excess speed for the prevailing road conditions, is the single most important cause of road casualties.

This is particularly true for casualties involving serious injuries and fatalities, notwithstanding the influence of contributory factors such as alcohol abuse. Speed is the most abused drug of all, and the biggest killer. Recent monitoring by the Tayside Police in Scotland, for instance, gave excessive speed as the principal causal factor in over 42% of the Region's fatalities in 1987 and of one third in 1988.

Findings that very few injuries occur at speeds of less than 30 kms/h, that drivers do not slow down for pedestrians, and that even child pedestrians are nonetheless held principally to blame for the accidents which occur, are convincing arguments in support of 30kms/h as a general speed limit on local residential streets, where the majority of child pedestrian casualties take place.

They are central reasons for the introduction of 30kms/h speed limit zones in an increasing number of countries; and the wider recognition of the importance of speed management has been a major influence on the development of traffic planning and engineering practice over the past 15 years.

Adjusting driving speeds to those appropriate to the road conditions would drastically reduce serious and fatal injury accidents, a fact long recognised in the imposition of speed limits. Fixed speed limits are crude instruments, however, and inefficient in that they have depended on enforcement which has been difficult and costly to provide and has usually been absent.

They have also been applied in inappropriate

ways which contribute to the wide-spread abuse of the limits. The inappropriateness of a particular speed limit to the actual conditions on the road is all too readily apparent to drivers and variations with time of day compound these problems. Widespread anomalies have been allowed to persist since, without effective enforcement, the finer tuning of speed limits has not been seen as a worthwhile option to pursue, especially on minor roads. Yet the need for a clear speed management strategy effectively linked to speed limits throughout the road system remains essential to the success of efforts to improve road safety.

## SPEED MANAGEMENT AND TRAFFIC CALMING

Traffic calming provides a key means of achieving speed reductions and the effective deployment of speed limits without enforcement. Moreover most categories of road can, to greater or lesser degrees, be re-designed to design speeds which correspond to speed limits appropriate to the surrounding road environment. Successful schemes have now been developed and implemented on everything from local residential streets to national highways.

On the highest categories of road such as motorways, enforcement techniques certainly remain essential, but there too the technical means exist to effectively assure compliance with speed limits.

Traffic calming practice to date, however, has been as much or more concerned with other objectives as with road safety. This allied to the unavoidable difficulties of getting clear-cut evidence of road safety success, in terms of reduced accidents or casualties for individual schemes (or even groups of schemes) has not made it easy to convince sceptics of traffic calming's road safety merits or governments (in Britain at least) to support it and make resources available.

Insofar as it achieves speed reductions, however, traffic calming is certain to yield accident benefits in terms of casualties; unless that is the risk compensation mechanism were to operate to completely offset such gains. There is no evidence that it does.

On the contrary evidence has gradually accu-

mulated that traffic calming schemes are yielding major road safety benefits, and without the necessity for the extensive (and expensive) redesign of streets. The aggregated results from Denmark's 30kms/h 'quiet roads', reported elsewhere at this congress, indicate this in impressive terms, as does evidence from West Germany. The reductions reported in casualty rates for these streets, of 72% in the Danish results after allowing for changes in the traffic level, would seem to suggest that levels of safety have been achieved which are comparable to those in residential areas designed for traffic segregation. Given that a proportion of the schemes included are known to be sub-standard in terms of design, so that compliance with 30kms/h speed limits is not always guaranteed, this level of success might seem remarkable. Once the central importance of speed to casualty reduction is fully acknowledged, however, such success is not so surprising.

## ROAD HIERARCHIES AND AREA SCHEMES

Over recent years, moves have been made to link the definition of the road hierarchy explicitly to speed categories and speed management, rather than traffic functions as such. Denmark for instance has based its roads standards on a simple two-tier distinction between traffic and local roads, and subdivisions into four speed classes (Figure 1). Similar speed category hierarchies are implicit in much traffic calming practice elsewhere.

Such a speed hierarchy approach allows flexibility, and is more realistic in existing built-up areas than attempts to impose a Buchanan-style functional hierarchy. The emphasis is also placed

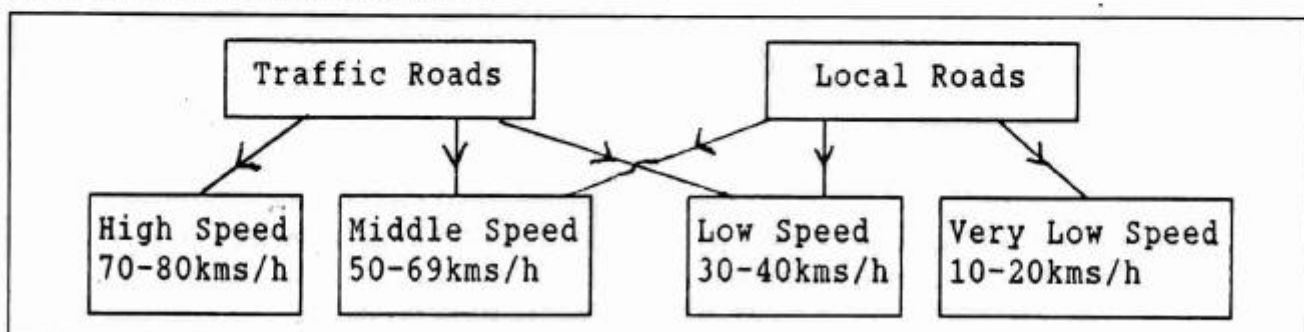
where it is needed for road safety, on speed.

Following the success of area-wide schemes such as those at Østebro in Copenhagen and Eindhoven and Rijswijk in The Netherlands, the need for area-wide road safety strategies and treatments has often been assumed. In Britain this has been a central thrust of the Urban Safety Project, findings from which are presented elsewhere at this Congress. Efforts have concentrated on the better organisation of the road hierarchy on traditional functional lines where this was possible. Some distributor roads were down-graded and modest treatments applied to reduce speeds: these treatments do not seem sufficiently intensive however, and speed reductions have therefore been relatively small. The casualty reductions achieved have been correspondingly modest (estimated at 10-15%). Where capacity restrictions severely limited the possibilities for changes in the hierarchy, as in Reading, results appear to have been disappointing.

The prospects for major road safety benefits from such restructuring therefore seems remote. Given rising traffic volumes and shrinking areas with substantial surplus route capacities, the capacity will simply not exist generally to allow substantial changes in the hierarchy, unless they are associated with policies of intensified traffic restraint. Moreover, area schemes involving such restructuring give rise to greater potential for conflicts between interest groups within the area and for corresponding delays. They are liable to be costly in staff time for intensive participation processes; and with no guarantee of implementation carry considerable risk of abortive labour. Even where such schemes are demonstrably superior in design terms, therefore, they are not necessarily a more efficient use of resources.

Given a simple, pragmatic, two-tier (traffic/local) definition of the urban road hierarchy, linked to a speed management policy frame-

Figure 1: Urban road classification, Denmark



work for the urban area as a whole, there seems little need for area schemes of this kind in usual circumstances. Scope would still exist for the status of a road to be changed, from traffic route to local street or vice versa, but the principal concern would be to restrict speeds to appropriate levels, irrespective of status or volume of traffic carried. Whatever the place of a road in a hierarchy, speeds lowered below the norm may be appropriate on sections of it, and the availability of traffic calming techniques make variable speed limits a realistic proposition.

Area priorities are readily set within such a policy framework; with size of area and roads for treatment flexibly selected and defined with a view to ease of implementation and maximal implementation on an incremental basis. Generally this would entail treatment areas much smaller than those featuring in the urban Safety Project. Much of continental Europe on practice to date, perhaps most notably so in the case of the Danish 30kms/h 'quiet roads', many of which have been incrementally implemented on a rather ad hoc basis, seems to support such a flexible approach.

In Britain, interest and experience in traffic calming is growing amongst local authorities, but a policy framework is still lacking.

## VALUE FOR MONEY?

In Britain there has been an over-emphasis on quantification and the use of cost-benefit analysis techniques in order to justify road safety schemes. In application at individual scheme level this has not been helpful to the evolution of traffic calming practice, or indeed to the evaluation of traditional black spot treatments. Given the problems of regression to mean and accident migration effects it seems impossible to justify the vast majority of schemes individually in this way. In a before and after comparison of casualty statistics for black spots treated highly successfully in cost-benefit terms in Hertfordshire with untreated junction sites in Lothian Region the untreated sites gave better results. (comparison by Dr. David McGuigan, Lothian Regional Council).

Yet traffic calming schemes on local roads, where a more comprehensive approach is required to deal with the more random distribution of accidents, are often regarded as expensive or

inefficient compared with such black spot schemes on the basis of just such dubious before and after calculations. In reality such traffic calming has been demonstrated to be effective even in road safety terms alone, and is readily affordable especially when implementation is linked to routine maintenance or other programmes.

## CONTRADICTIONS ON MAIN ROADS

Road safety results from traffic calming schemes on main roads appear to have been less impressive to date than those on less important routes, although the pattern is uneven and evaluations are continuing.

A principal reason for any relative lack of success is an apparent reluctance to introduce speed reduction measures of sufficient severity. Vertical features in particular are frequently ruled out because of the sharper effects of conventional humps or ramps on larger vehicles such as buses. If design speeds are then set to enforce a speed limit for larger vehicles this invariably allows car speeds substantially above the limit. Such schemes often depend for their speed reduction effectiveness on the presence of other vehicles and/or a degree of congestion.

Despite the tentative nature of many initiatives, significant speed reductions and road safety benefits are being realised, in Britain as elsewhere.

More complex main road schemes inevitably bring contradictions with other traffic calming and wider policy objectives. The reduction of barrier effects to pedestrian movement in shopping street schemes is an obvious example. If pedestrians feel more secure and therefore cross the road more frequently, pedestrian casualties may not decrease and could even increase, although a reduction in their severity would still be expected. In situations such as these priorities and expectations need to be clearly established.

Further contradictions arise where there is provision of priority for cyclists. Cycleways can lead to new conflicts between pedestrians and cyclists at crossing points such as bus stops, and these have been a factor in increased casualty rates for cyclists.

The degree of priority afforded to cyclists in some schemes is questionable in road safety terms.

The road safety potential of traffic calming on

main roads remains largely to be exploited through the resolution of such conflicts.

As the speed class of the road increases, however, the self-enforcing power of design features declines, and increasing reliance must be placed on enforcement techniques.

## A SPEED MANAGEMENT APPROACH IN LONDON

In 1985 private consultants were commissioned by the Department of Transport to carry out several area-wide studies of transport problems and possible solutions. The results were done towards the end of 1989. One of these studies, embracing some 50 square kilometres of north-east London, has presented traffic calming options based on a speed management classification of the road network.

The aim was to tackle a range of problems resulting from high traffic volumes and speeds including accidents, severance of communities, perceived danger, pedestrian fear and intimidation, environmental degradation, difficult access to properties and poor public transport. Traffic calming could not in itself tackle the further problem of widespread traffic congestion, but new road and rail schemes were also included in the study options.

The study area was divided into "traffic areas" and "living areas" (similar to the Dutch demonstration projects in Eindhoven and Rijswijk) to provide a design and policy framework in which traffic calming and speed reduction measures could be developed. See Figure 2.

Figure 2: East London assessment study - Traffic calming road classification

**LIVING AREAS:** *Pedestrians, cyclists, residents 'parking and other living functions will have priority over motor traffic. Speeds not to exceed 20 mph (30 kms/hr) self enforcing.*

a. *Local streets, traffic only seeking access to property.*

b. *"Collector" streets connect to traffic areas, but not designed as through routes.*

**TRAFFIC AREAS:** *Through traffic routes where vulnerable road users are protected. Maximum speed 30 mph (50 kms/hr) not self enforcing, signposted routes.*

c. *Sections of through routes where (subject*

*to maintenance of existing traffic capacity) priority is shared between Living and Traffic functions.*

d. *Through routes where traffic takes priority.*

Many residential streets in the area carry through as well as local traffic, about 70 kilometres carrying peak volumes of 1000 vph or more. Diversion of this unwanted traffic onto established main traffic roads is problematic, because the main roads are mostly congested and already account for the major proportion of road accidents and traffic/environment conflicts. Two alternative levels of traffic calming have been put forward, the first retains the existing volume and distribution of traffic; the second seeks to reduce overall peak hour traffic volumes and thus has wider implications. The consequences are shown in Figure 3.

In both levels parts of the "traffic areas" with the most intense conflicts would be redesigned to achieve shared priority between through traffic and pedestrians, cyclists, parking, loading and amenity space (category c in Figure 2). In these sections, mainly shopping streets, vehicle traffic would move more slowly because of the need to give way to other users. The existing 30 mph limit would remain. Overall network speeds would be unchanged, however, because these are determined by the capacity of critical junctions whose capacity would be retained.

Reduction of speeds in the "living areas" to 20 mph would be likely to divert some traffic in some combination of the following ways:

- diverted onto "traffic area" streets, especially at off peak times when they have spare capacity;
- diverted onto new or upgraded roads (if built);
- diverted to other modes of travel;
- diverted to alternative destinations or times;
- trips shorter or no longer made.

There was no method of estimating the relative importance of these possibilities. Traffic calming would, however, be easier to implement (from a political and a technical point of view) if traffic reduction could be achieved by an integrated programme of strategic traffic restraint and/or investment in rail transport capacity and quality. An evaluation of the Traffic Calming options against the problem solving objectives of the study showed a good performance com-

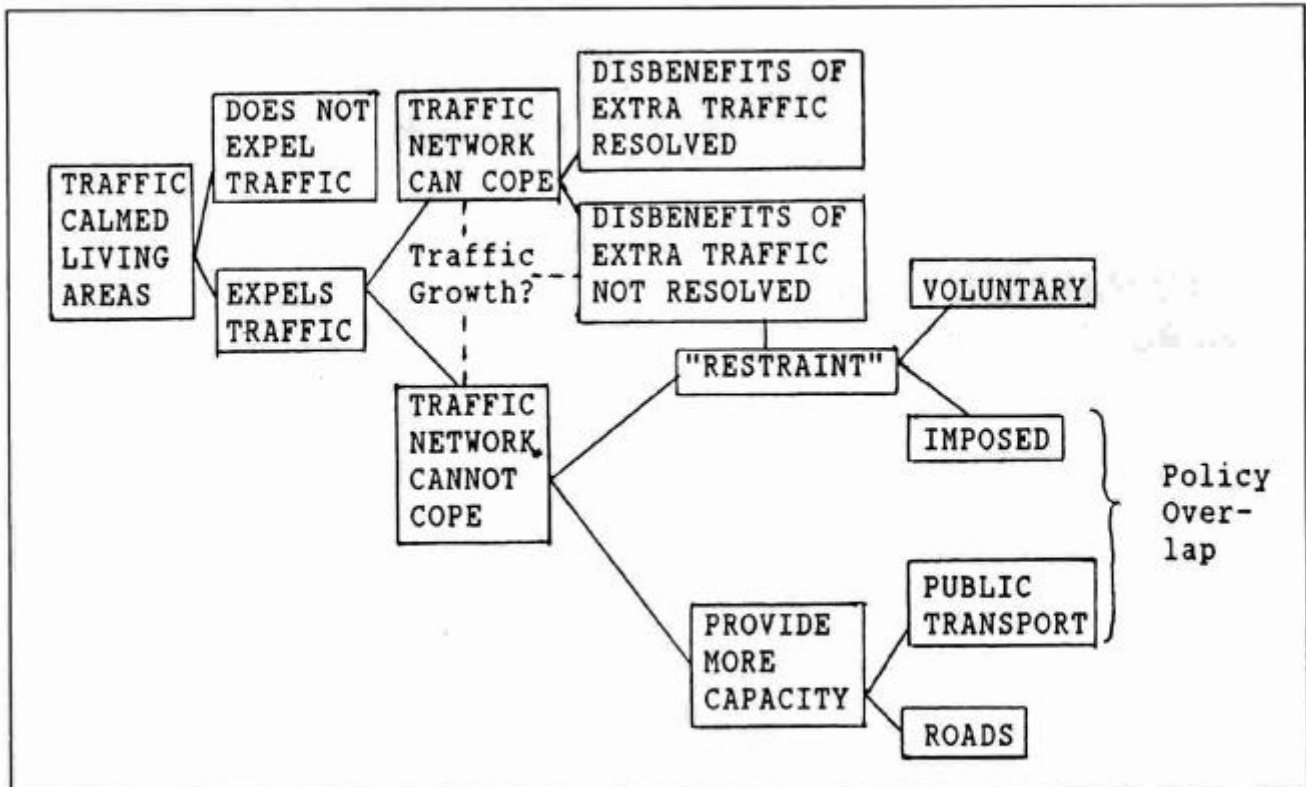


Figure 3: Consequences of traffic calming in congested urban road networks

pared to other more expensive (road building) options.

## WIDER CONTRADICTIONS

The traffic calming philosophy is gaining ground in Britain as elsewhere, but there remain many contradictions and inconsistencies. On major roads for instance, the "road safety" strategy is still the straightening of bends rather than slower speeds. Effective techniques exist (videos, radar, speed governors, helicopter surveillance, stiff penalties) for effective speed limit enforcement but are rarely used even on busy motorways.

Attempts to promote safety consciousness and compliance with speed limits are consistently undermined by developments in vehicle design and car advertising. Although here in France there is a ban on adverts which exploit the speed of cars, in the UK and elsewhere the "machismo" image is still central to car promotion, with advertisements emphasising speed, power and performance more frequently than all other themes (such as safety, style or practicality) put together. Car design is seriously out of line with road safety objectives and policies. In all European countries except West Germany, maximum

legal speeds range from 100 kms/h (Denmark, Greece) to 130kms/h (Austria, France, Italy).

Yet out of 422 models of car on sale in the UK in 1989, 97% were capable of speeds higher than 130kms/h. 84% of models can exceed 150kms/h and 27% can exceed 200kms/h. Half of all models have acceleration of 0 - 100kms/h in 10 seconds or less. Such performance leads to unnecessary danger and intimidation of other road users, and is wasteful of fuel and other resources.

of course, in order to achieve integrity of design, vehicles capable of high speeds must have excellent braking, cornering, stability and comfort features built in. The more that these features are improved, the more difficult it becomes to persuade people to drive more slowly. The design of traffic calming measures such as humps and chicanes must become more severe as money is spent developing vehicle technology to counteract their effectiveness. The Citroen, for example, seems less affected by the standard UK speed hump than many other makes of car. In short, car design and promotion is undermining road safety and traffic calming efforts.

There are strong road safety and environmental arguments for an international code of practi-



ce on vehicle design and performance which limits maximum speeds and other performance features. For driving in built-up areas, speed governors fitted to vehicles could be activated according to the prevailing speed limits.

This has been suggested in the UK, and apparently a prototype vehicle with different speed modes has been developed in Nordrhein-Westfalia. In the longer term the development of such technology could reduce the need for expensive

physical speed control measures in urban streets.

In the UK there has been a fundamental and positive change in public attitudes to drinking and driving. What is needed now is a comparable shift of attitudes about the dangers of speed. This will not be fully achieved, however, until the present contradictions have been eradicated.