

Surrey County Council

Traffic Calming Good Practice Guidance

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Traffic calming is an important technique in reducing both the number and severity of road accidents in Surrey. The County is committed to the promotion of traffic calming schemes where the benefits can be shown to outweigh the disadvantages. In particular, it will give priority to those schemes where the accident reduction potential is greatest.

In 2000 the Government published 'Tomorrows Roads Safer for Everyone' which included the national road safety casualty reduction targets for the year 2010. The targets (to be measured by comparison with the 1994 to 1998 averages) were:

- a 40 per cent reduction in the number of people killed or seriously injured (KSI) in road accidents;
- a 50 per cent reduction in the number of children (under 16 years of age) killed or seriously injured; and
- a 10 per cent reduction of the slight casualty rate, expressed as the number of people slightly injured per 100 million vehicle kilometres travelled.

Since then, Surrey County Council, in Partnership with Surrey Police and eight local councils, have embarked on a Government Local Public Service Agreement (LPSA) to achieve the KSI and slight targets by 2008 which, if successful will attract a performance reward grant. In numerical terms, the LPSA target is to reduce KSI casualties to 442 and slight casualties to 5943.

Successful and consistent implementation of speed management policies, and in particular traffic calming good practice, will be a key factor in achieving this reduction and the new targets. Traffic calming has a proven ability to reduce the number and severity of road accidents, particularly in residential areas, and can play a major role in this strategy.

An investigation of various traffic calming schemes introduced in Surrey in the early nineties has shown that initial reductions in accidents (by 68%) have been maintained in the longer term.

Given these statistics, it is important that the potential benefits of traffic calming continue to be fully exploited to achieve the necessary scale of accident reduction.

Available traffic calming techniques differ in effectiveness and are appropriate to various specific circumstances and the purpose of this document is to ensure good practice in the use of traffic calming.

In some circumstances it may be appropriate to promote traffic calming schemes to meet the environmental objectives of Local Transport Plan 2 (LTP2). For example, the use of calming techniques to assist cyclists and pedestrians (particularly the mobility impaired) in general and to promote walking and cycling to school is entirely consistent with County policy.

Any schemes that might shift 'rat-running' traffic must be carefully developed to ensure fairness and that traffic does not merely divert to other inappropriate roads.

The first traffic calming policy (March 1996) was developed using accident data collected from nine pilot traffic calming schemes introduced in Surrey between 1990-92 and research carried out both in Surrey and nationally.

The Highways (Road Hump) Regulations were greatly relaxed in 1996 and this, together with experience gained, has brought about the need to review existing practices. This revised good practice guidance should also be considered in the context of the [County Speed Management policy](#) and the [DfT publication LTN 1/07 Traffic Calming](#).

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Traffic Calming Definition

The Traffic Calming Act 1992 defines "traffic calming works" as "works affecting the movement of vehicular and other traffic for the purpose of promoting safety or preserving or improving the environment through which the highway runs".

Other interpretations of the term "traffic calming" are in more general use. Traffic calming can be defined simply as the use of self-enforcing speed reduction measures.

[Vertical deflection](#) traffic calming measures include [round top humps](#), [flat top humps \(tables\)](#) and [road cushions](#) (smaller humps that allow wider wheel tracked vehicles to pass unhindered). Vertical deflection traffic calming has been particularly successful in reducing speeds and consistently achieves accident reduction in excess of 60%. Vertical deflection is most suited to residential roads, where as advised by the DfT, average speeds of 20mph are appropriate.

[Horizontal deflection](#) traffic calming measures include [chicanes](#) and road narrowings. Horizontal deflection schemes do not generally reduce speeds below 30mph and are unsuitable when slower speeds are required, although site circumstances and designs differ greatly. However, by virtue of the lesser speed reduction, typically horizontal deflection schemes are less effective than vertical schemes in terms of accident savings, and proved less popular with residents surveyed as part of the pilot scheme studies.

More philosophically, traffic calming is a technique aimed at reducing the environmental impact of the motor vehicle by reducing conflict with more vulnerable road users such as cyclists and pedestrians. As stated earlier, traffic calming is also consistent with the aims of a sustainable transport policy in promoting cycling, walking and, in certain cases, public transport.

Whilst the various traffic calming measures are techniques designed to achieve such policy aims, a traffic calming scheme could involve the use of other traffic management techniques. For example, road closures, mini roundabouts, cycle tracks, changes in junction priority or bus priority measures may not in themselves be considered traffic calming measures yet their use may be entirely compatible with the aims of a traffic calming scheme.

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Accidents and Speed

An analysis of contributory factors for accidents in Surrey during 2006 showed that 37% involved either exceeding the speed limit, driving too fast for the conditions or a vehicle skid. Where vehicle speed is not specifically identified as a factor in an accident, closer examination of the circumstances often suggests that the accident may not have occurred if the vehicle(s) involved had been travelling at slower speed.

The DfT advise that a speed of 30 mph is too fast for roads in purely residential areas and that 20mph is more appropriate. This is also acknowledged in the design criteria for new housing development and [Manual for Streets \(MfS\)](#) which prescribe against the use of long straight sections of road to prevent the build up of speed.

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Severity

In the event of an accident, the severity of any injury involved is likely to be reduced at a slower impact speed. Research in the UK has shown that a pedestrian has only a 17% chance of survival following a collision with a car travelling at 45mph. This compares to 63% surviving a 30mph collision and 95% surviving at 20mph. The effect of relatively small reductions in speed is well illustrated by an example based upon the stopping distances published in the Highway Code. A braking vehicle initially travelling at 35mph will hit a pedestrian 75 feet away at 21mph. The same vehicle travelling at 30mph could have been brought to rest over the same distance.

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Residential Areas

In residential areas the pattern of accidents is often scattered. This may be partly due to driver familiarity with an area inducing increased speed and reduced concentration. At public exhibitions of traffic calming proposals in Surrey, residents have often suggested a problem with speeding through-traffic. Traffic surveys have more typically indicated otherwise, with most traffic being locally generated. In such cases, most drivers are regular users of local residential roads yet some still choose to drive too fast.

In the circumstances described above, the introduction of self-enforcing traffic calming measures can bring great benefit to residential areas, in terms of both accident reduction and environmental improvement. By creating a safer environment, the accident potential is reduced as are the fears of residents, particularly parents and the elderly. This reduced fear in itself represents a real improvement in the quality of life.

Although this illustrates the possible benefits of traffic calming in residential areas, this does not mean that traffic calming methods can not be used in other sensitive areas (eg town centres) where vehicle speed is a problem. In general, most traffic calming measures are only suitable for use where the speed limit is 30mph. Less restrictive measures such as hatching and pedestrian refuges could 'calm' traffic where higher speed limits are in operation.

Vulnerable Road Users

All traffic calming schemes must provide for the needs of cyclists and pedestrians, and in particular for the mobility impaired. This is fundamental to the philosophy of traffic calming and scheme design must reflect this.

Traffic calming should not be seen purely in the context of accident statistics. For example, the 'Safe Routes to Schools' (SRS) initiative has highlighted that children's road sense, growth in independence and physical fitness are greatly restricted by the perception of parents that it is unsafe for children to travel to school other than by car.

Together with educational initiatives and the provision of other facilities such as pedestrian crossings and cycle routes, traffic calming can assist in addressing parents' fears and contribute to improving the health of the nation by providing a safer environment to walk and cycle.

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National Legislation and Advice

The main powers by which Highway authorities introduce traffic calming have been provided by the following legislation:-

- (a) The Highways Act 1980 – allowed the introduction of pinch-points, kerb buildouts and pedestrian refuges.
- (b) The Transport Act 1981 – modified (a) to permit the construction of road humps
- (c) The Highways (Road Humps) Regulations 1990 – specified the necessary criteria for the construction of road humps
- (d) The Road Traffic Act 1991 Section 45 – allowed Highway Authorities to construct road humps that do not conform to (c), subject to the approval of the Secretary of State.
- (e) The Traffic Calming Act 1992 – allowed the introduction of calming measures that were not otherwise clearly authorised eg chicanes. The then DoT issued the Traffic Calming Regulations in 1993 which outlined the most common measures and the specifications for rumble devices and over-run areas.
- (f) [The Highways \(Road Humps\) Regulations 1996](#) – very much simplified matters, leaving the design and location of road humps as a matter for local authorities to determine. Traffic Advisory (TA) Leaflet 7/96 provides guidance on the use of road humps, but stresses that previous technical advice issued on road humps is still generally relevant.

Now the only road hump dimensions constrained by regulations are:-

Maximum height 100mm with no tolerance
Minimum height 25mm
Minimum length 900mm
No vertical face to exceed 6mm in height

Road humps may now be installed on trunk and principal roads with speed limits not greater than 30mph without special authorisation.

A full list of Traffic Advisory (TA) leaflets can be found on the [DfT website](#).

Most recently the DfT have published [LTN 1/07 Traffic Calming](#), which provides detailed advice. LTN 1/07 is generally consistent with SCC good practice guidance, and an additional [explanatory note](#) is provided outlining its main content and minor differences in detail.

In addition, the principles of the Disability Discrimination Act 1995 (DDA) and the Human Rights Act 1998 (HRA) can be interpreted to be relevant to the provision of facilities on the highway by local authorities. Whilst untested in this area by case law, it is important to be aware that the spirit of this legislation is to safeguard the rights of all citizens and in particular those with mobility impairment.

Although the principles of the DDA can be more easily interpreted for application in relation to the highway, elements of the HRA are less precise. For example, Article 2: the right to life, Article 5: the right to liberty and security, and Article 8: the right to respect for private and family life could arguably also be impinged by a badly designed highway scheme.

All County policy is governed by national legislation. The County traffic calming policy should therefore be considered in conjunction with the relevant highway legislation.

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Stages of Scheme Development

This good practice guidance is based upon following a procedure, and this section outlines the necessary stages in the development of a traffic calming scheme. Policy statements should be considered in the context of the main text and not in isolation.

With regard to the promotion of schemes which are either departures from policy or require DfT authorisation, these should be progressed via informal consultation with Transport Strategy.

It is recommended that written records of scheme development are kept.

The County policy on traffic calming comprises specific statements and recommended good practice relating to each element of the policy. The following sections incorporate policy within detailed guidance relating to each stage of scheme development.

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STAGE 1 - IDENTIFY NEED

Traffic calming should only be used when it is the most appropriate solution to a problem. This is most likely to be when speed is identified as a contributory factor to an accident problem in an area where there are vulnerable road users.

Traffic calming should not be prescribed immediately as the solution to a problem. It must represent the most effective solution and this can only be determined as a result of a thorough investigation of an identified problem.

Although generally County policies give priority to schemes with the greatest accident reduction potential, this does not rule out using traffic calming to achieve environmental aims in line with the objectives of LTP2. Schemes designed to encourage walking and cycling in residential areas, in particular SRS initiatives aimed at reducing car use for the school journey, can benefit from the speed reduction induced by traffic calming.

Such schemes are introduced largely to influence the perception of risk felt by the most vulnerable road users, to encourage walking and cycling. This objective is not merely concerned with traffic reduction but is concerned with physical fitness. Health experts are concerned about the growth of obesity and heart disease particularly in the young and have estimated the increased burden on national health resources as a result of this trend to be greater than that from road traffic accidents. This suggests that one way of evaluating a traffic calming scheme might be in assessing how many new walking and cycling trips are generated.

To avoid abortive work, it is essential to establish at the earliest possible stage that a scheme has a realistic prospect of progression. A broad initial assessment should be based upon how a scheme meets LTP2 objectives before a comprehensive study is carried out.

In summary, traffic calming is most likely to be appropriate when:-

- (a) there is clear casualty reduction potential from its use to solve a speed related casualty problem
- (b) existing traffic speeds are inappropriate and vulnerable road users are particularly at risk
- (c) through traffic has diverted from the strategic road network onto less appropriate roads
- (d) it will promote walking or cycling, in particular for the journey to school.

All traffic calming schemes must have specific objectives relating in some way to the above and it is essential that the success (or otherwise) of schemes should be assessed against these aims.

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Developer Funding of Traffic Calming Schemes

Each situation must be investigated on its individual merits to assess the suitability of a traffic calming solution, if newly generated traffic is likely to use inappropriate roads. In relation to development proposals, the onus is firmly on the developer to demonstrate that, following detailed study, the effects of any generated traffic will (at least) be nullified by an appropriate traffic calming scheme.

A comprehensive area study of the existing highway network, traffic speeds and land use, including consultations with bus operators and emergency services, is required. The study must fully take into consideration the principles of scheme development as described in this policy, although public consultation is not required at this stage. However, assuming that the study confirms the need for a traffic calming solution, then a public consultation, as set down elsewhere in this policy, will be necessary and paid for by the developer.

In normal circumstances, all aspects of the study and any resultant scheme will be funded by the developer. All costs associated with construction and maintenance for the designated life of the scheme must also be borne by the developer.

In addition, there may be circumstances where developers fund traffic calming schemes voluntarily. However, it is important to note that the availability of voluntary developer funding will neither result in an unwarranted scheme being implemented nor influence existing scheme priorities.

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Private funding of Traffic Calming Schemes

It is existing County policy to support the principle of private funding of traffic calming schemes although the same principles as for developer funding outlined above apply. Also, the practicalities of private funding are complex requiring a legal agreement, involving issues such as maintenance and liability insurance.

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STAGE 2 - AREA STUDY

Safety investigations require an area-wide study in order to avoid any migration of accidents or inappropriate traffic diversion

The effects of the introduction of traffic calming measures on a road are rarely limited to that road. More commonly, implementing a traffic calming scheme on a single road in isolation would result in a diversion of traffic on to the most convenient alternative route, and this may not be desirable.

An area-wide study should enable an equitable scheme to be developed that discourages through traffic. Any shift of traffic should reflect the status of the roads involved but more particularly the land use (eg schools, housing), frontages (eg shops) and the level of pedestrian and cyclist activity. It is important not to underestimate the volume of locally generated traffic that will divert following the introduction of traffic calming and to ensure that any such shift is equitable.

An area-wide study does not necessarily imply the introduction of area-wide traffic calming. However, this is often the case and can bring benefits. By creating a zone where speeds are firstly reduced on entry and then maintained at appropriate levels by a combination of traffic calming and road geometry, steady speeds can be induced. Drivers perceive little benefit from excessive braking and acceleration when there are a succession of measures on all available routes through a zone.

Although no additional safety benefits are likely to result, the creation of a formal traffic calmed zone might in some cases be seen as beneficial if minimising signing and lighting is desirable. (see [20mph zones](#)).

It is essential that the development of traffic calming schemes considers other studies or programmed works that might possibly affect the area under investigation.

It is important to firmly establish the precise boundary of the area under study as all addresses within the study area are **directly affected**. The study area should include all roads where proposals may have an effect on traffic movements and is likely to include roads where traffic calming is not proposed. In addition, some roads, typically culs de sac, may feed directly affected roads with no available alternative route and these should also be included in the study area.

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STAGE 3 - PRELIMINARY CONSULTATION

Full consideration should be given to the views of any affected bus service operators and the emergency services prior to preliminary scheme design.

Early consultations with any affected bus operators and the emergency services are essential to ensure a mutually acceptable scheme. This consultation should be carried out as soon as the need for traffic calming has been established and the affected area defined, but before any other preliminary work.

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Bus Service Operators

Where proposed traffic calming affects a bus route, then the relevant bus operators should be consulted via the County Passenger Transport Group (PTG). Traffic calming schemes should, where possible, aim to improve public transport provision through the use of bus priority measures.

The PTG and the bus operators hold the view that [road cushions](#) are a more attractive option than [road tables](#) on bus routes.

It is important however that traffic calming schemes where possible are designed to facilitate continued bus penetration. Unsympathetic schemes will discourage companies from providing services causing difficulty and hardship for bus users.

The use of traffic management measures that specifically accommodate buses may not in themselves be traffic calming devices but their use within a traffic calming scheme may be entirely consistent with the schemes objective. Such measures include electronically activated bus gates, removable barriers at road closures, bus lanes and Selective Vehicle Detection (SVD)

Meeting the requirements of the Disability Discrimination Act 1995 has resulted in increased provision of low floor buses. Some operators have already suggested that the bus design necessary to meet this requirement will reduce bus penetration into smaller access roads. Although road tables should not be a problem with low-floor buses, traffic calming scheme design must take into consideration this change, particularly in relation to bus stop location.

In addition, recent legislation has permitted increased bus lengths and developments in national 'best practice' have necessitated changes in the specification of traffic calming measures. (see [road tables](#)).

Emergency Services

In general, the emergency services oppose traffic calming schemes in principle as they believe they adversely affect response times. This would seem a reasonable stance given their legal obligations but the issue is more complex, other factors have influence:-

- (a) Traffic calming can reduce the number of road traffic accidents that emergency vehicles need to attend.
- (b) Traffic calming measures are not usually located on strategic traffic routes but on more local roads, which are the routes least used by emergency vehicles.
- (c) Surveys (at Feltham Hill Rd, Ashford) have shown that the decrease in junction delay due to the shift of traffic from traffic calmed roads can outweigh any increase in journey time caused by the calming measures (estimated at 4 seconds per road table).
- (d) Each scheme is different. For example, opposition has been expressed to vertical traffic calming schemes in general. However, the fire service in Woking has expressed a preference for an existing road table scheme which they feel can be more easily negotiated at speed than a nearby chicane scheme.

In summary, all schemes require comprehensive consultation with the emergency services to consider all relevant factors and must be assessed on their individual merits. Every attempt must be made to minimise the effects of traffic calming on the emergency services both in terms of passenger comfort and response time. The benefits of a traffic calming scheme should clearly outweigh any unavoidable increases in emergency vehicle response times.

DfT guidance ([TA leaflet 1/07 Fire and Ambulance Services traffic calming: a code of practice](#)) advocates agreeing a road hierarchy of strategic routes unsuitable for traffic calming. In practice, however, strategic routes are rarely appropriate for measures that would affect response times and consultation on the specifics of individual schemes remains good practice guidance.

At the preliminary consultation stage, no proposals will have been formulated which might make it difficult to specify which roads will be affected. However, this does mean that the emergency services (and bus operators) are able to get their views considered at an early stage and are thereby better placed to influence scheme design.

Consultation on traffic calming proposals must inform the public of any implications on bus services and emergency service response times.

Other Consultations at Preliminary Stage

All relevant County and District Councillors should be consulted at this stage.

If the need for traffic calming within a conservation area has been established then the relevant District Planning Officer should be consulted. This is to ensure the development of a scheme appropriate to the conservation area status. Any enhancements necessary for environmental reasons may affect the cost of the scheme but must not compromise safety.

The County Cycling Officer and local cycling group should be consulted to ensure any existing or possible future cycle schemes in the area are considered. Where practicable, cycle facilities should be incorporated within any scheme proposals.

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STAGE 4 - PRELIMINARY SCHEME DESIGN

A) DESIGN SPEED

All schemes should be designed with the aim of achieving a specific average speed in free-flow conditions appropriate to the location.

The principle behind the above policy statement is that, in accordance with the Speed Management policy, it is important to initially establish the appropriate speed for the location and hence the necessary speed reduction.

Unfortunately speed investigations in Surrey (and elsewhere) have not provided definitive information about how to achieve specific speeds. Data has been conflicting with apparently similar schemes resulting in varying degrees of speed reduction.

Despite these limitations, the available information on speed (see [Surrey Research](#) and [LTN 1/07](#)) provides a guide to scheme design and the spacing between measures. The aim of having a specific design speed is to ensure a scheme is designed with a specific speed reduction objective. This is important in ensuring a consistent approach to traffic calming and to allow the subsequent evaluation of any particular scheme against its design speed.

In practice, the design speed of a scheme should be the '*average free-flow speed at a representative site*'. This is defined as the average of the average speed at the traffic calming measure and the average speed at the fastest point on the approach to the measure. All references to 'speed' relate to this definition unless otherwise stated.

This free flow speed principle encourages the use of speed measurement by radar gun rather than by automatic equipment and is consistent with the basic speed criterion used by the then DETR for establishing 20mph zones.

Average speed is more commonly understood than 85%ile speed. This is particularly important when presenting speed information to the public at the consultation stage.

Also, free flow radar speeds are more meaningful (and cheaper to obtain) than automatically measured speeds which include all vehicles including those constrained by the vehicle(s) in front and by unknown influences such as short term parking.

Traffic calming schemes in Surrey show 85%ile speeds at representative sites to be consistently 3-4 mph higher than average speeds for all existing variations in schemes and spacings. Therefore changes in 85%ile speed are likely to be of similar magnitude to changes in average speed and as such be of no greater significance in safety terms in the evaluation of traffic calming schemes.

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Speed Reduction

Traffic calming measures, as commonly understood, can only be introduced on 30mph speed limit roads. However, the speed reduction measures necessary to bring speeds down will depend upon the existing speed and the speed considered appropriate for the location. For example, central islands, hatching or kerb build-outs could reduce speeds to just below the 30mph limit whilst elsewhere road tables could result in speeds of 20mph. In both cases the schemes may be considered effective in speed reduction terms dependent upon the character of the roads involved.

In practice the range of 'design' speeds is therefore likely to be between 30mph and less than 20mph dependent upon the nature of the roads involved.

Two important reasons for specifying an appropriate design speed are to enable consultees to understand the strategy behind any proposals and to allow the future evaluation of the effectiveness of the scheme in terms of its speed reduction objectives. The latter may have implications on the evolution of guidance.

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Spacing of Measures

Vehicle speed reduces as the spacing between traffic calming measures is reduced. Surveys in Surrey have established relationships between speed and spacing at different sites for different types of measure. Although providing broadly similar results, studies on various hump / table schemes nationally underline the wide variations in speed reduction that can occur when apparently similar traffic calming techniques are used at different sites. The results from [Surrey Research](#) relate to a small sample of sites of differing nature and the derived speed / spacing relationship for 100mm tables should be viewed with caution.

For 20mph zones, designers should adopt a 'safe' approach (ie reduced spacings) in order to ensure the average speed criterion is satisfied.

Spacings between measures greater than 100m do not encourage drivers to adopt steady speeds, but induce increased braking and acceleration. Apart from increasing the speed between measures, this is likely to increase traffic noise. Therefore the spacing between vertical deflection traffic calming measures should not exceed 100m.

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Ramp Gradients

[Surrey Research](#) at road table schemes show that vehicle speed is also related to the ramp gradient of the table. Speeds at two schemes have been measured and an 80mm high table scheme with gradient of 1:25 (Park Barn, Guildford) recorded speeds 4mph faster than a 100mm high table scheme with a gradient of 1:15 (Feltham Hill Rd) for comparable spacings. From the limited data available from all sites in Surrey where there are small differences in hump / table height, there is no clear relationship between speed and height of the measure. Whilst not conclusive, this suggests that the gradient of the ramp has a greater effect on vehicle speed than the height of the measure.

At Feltham Hill Road where there is a series of 100mm high road tables, complaints followed the construction in error of one ramp at a steeper gradient than the 1:15 specified which had the result of greater speed reduction. The ramp gradient has now been corrected and there have been no further complaints. It is not clear whether the problem stemmed from the steeper gradient alone or from drivers travelling over the offending table at the same speed as the other tables in the series.

This emphasises the importance of ensuring that ramp gradients are built to specification with checks carried out during construction to prevent the creation of a hazard and to retain the credibility of the scheme with both drivers and residents.

All traffic calming schemes must be constructed accurately to specified dimensions. The legal maximum height of a vertical deflection traffic calming scheme is 100mm with no tolerance. Failure to construct accurately will also result in the problems described above, and affect the validity of speed monitoring and scheme evaluation.

[\(TA leaflet 2/96: 75mm High Road Humps\)](#)

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Speed on the Approach to a Scheme

The legal requirement to have a speed reduction measure (such as a change in priority or bend) on the approach to a hump scheme was removed in 1996. However the principle that vehicle speed needs to be controlled in advance of any vertical deflection scheme is sound and still applies.

It is recommended that a speed reduction measure be provided on the approach to the first measure if average speed on the approach is greater than 25mph (or if 85%ile speed is 30mph or greater).

This recommendation is consistent with DfT guidance for 20mph zones i.e. that in a 20mph zone, typical average speeds at a series of road tables might be 15mph with 25mph midway between tables.

In other words, a vehicle should not approach the first road table (or cushion) of a series at a speed faster than it would a similar measure within the series.

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Other Speed Considerations

Although the design of traffic calming schemes demands an element of innovative thought, this should not be at the expense of proven traffic management good practice. For example, a mini roundabout is often used as a speed reducing measure on the approach to a traffic calming scheme, and must be designed to achieve this aim. A poorly designed mini roundabout with very low turning traffic movements and limited physical deflection will have a minimal speed reduction effect on straight ahead vehicles approaching the traffic calming scheme.

Similarly, traffic calming schemes designed to allow motor vehicle passage at a specified speed should not jeopardise the safety of other road users. The recommended specifications for the dimensions of footways, cycle tracks, pedestrian refuges and all other aspects of traffic management relevant to vulnerable road users and those with mobility difficulties should not be compromised.

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B) DESIGN FOR THE ENVIRONMENT

All traffic calming schemes must be designed to be safe for all road users and not adversely affect the local environment.

Traffic calming schemes can be promoted not only for accident reduction purposes but also for environmental benefit. It is essential that in both circumstances the developed scheme is both safe for all road users and compatible with the existing environment. Furthermore, the design of all traffic calming schemes should specifically safely provide for the needs of all vulnerable road users, and in particular the mobility impaired.

This section evaluates the suitability of various vertical and horizontal deflection traffic calming techniques and outlines other elements of design which require consideration.

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Vertical Deflection Traffic Calming

Road Tables

The appropriate dimensions of road tables are dictated by whether the road is or is likely to be on a bus route. In such cases the flat top of the road table should be at least the length of the wheelbase of the longest bus likely to use the road. Following advances in bus design, an EC Directive and advice from bus manufacturers, the minimum length of flat top permitted on a bus route has been increased from 6m, as specified in the first traffic calming policy. With new schemes, **the flat top of a road table on a bus route should be at least 7.5m long.** Although this change is not intended to be applied retrospectively, any difficulties arising with existing schemes will need to be investigated on their individual merits.

If the County Passenger Transport Group confirm that the road has no potential as a bus route, then the flat top of a road table can be reduced to a minimum of 4m, which would accommodate the wheelbase of the largest emergency vehicle.

Ramp gradient (and table spacing) can be varied to achieve differing speed reduction effects. In respect of the comfort of vehicle occupants and the effects on the emergency services, **the ramp gradients of road tables must be no steeper than 1:20 on bus routes and 1:15 on other roads,** in line with Transport for London (TfL) guidance and advice.

Similarly, for the benefit of buses and the emergency services and to ensure that table height never exceeds the legal maximum of 100mm with no tolerance, **the maximum height of all road tables should be 75mm**. Again any possible retrospective application of policy must be assessed on its individual merits.

Within the limitations of providing the necessary spacing between measures, every effort must be made to locate all kerb to kerb road tables where pedestrians are likely to cross and should be encouraged to do so. Similarly, where practicable, it is recommended that road tables be located at a maximum distance from bus stops. This is in consideration of the comfort of bus passengers who may be preparing to alight. The introduction of 'kneeling' low floor buses also means that bus stops should not be located at road tables.

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Round Top Humps

Consultation with the emergency services and bus operators, as well as the feedback from disabled groups, pedestrians, motor cyclists, pedal cyclists and drivers, suggests that round top road humps are less acceptable than road tables. Therefore, **round top road humps should not be used**.

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Tapered Edge Road Tables

There can be problems with the kerbside gap where tables are tapered at the edges. A gap could be used by cyclists but could also encourage car drivers to steer close to the kerb in order to pass over the table with their offside wheels only. This could reduce the speed reduction effect and intimidate cyclists. The overall calming effect of kerb to kerb table construction on other traffic provides a net benefit to cyclists and any disadvantage for cyclists is considered minimal given a ramp gradient no greater than 1:15.

Any gap between edge of table and the kerbside also represents a potential hazard to crossing pedestrians, particularly to the mobility impaired, whilst kerb to kerb construction encourages pedestrians to cross at the point where vehicle speeds are at their lowest.

The basic principle of traffic calming involves not only accident reduction but also an increased emphasis on the safety of the vulnerable road user. Kerb to kerb construction demands carefully designed drainage which must ensure that surface water does not run off the table on to the footway. Although the provision of additional drainage can increase costs by between 33 and 44%, providing for the vulnerable road user is an essential element of any traffic calming scheme.

In view of the above, **all road tables should be constructed from kerb to kerb. Tapered edges should only be used at locations where pedestrians are to be specifically discouraged from crossing.**

Possible exceptions to the above could involve a rural location where there are no kerbs / footway or pedestrian activity, or in residential areas where there are existing dropped kerbs directly opposite each other which provide frequent suitable crossing points. The principle behind this policy statement is to ensure adequate provision for all pedestrians and any proposed deviation from this policy should be agreed with Transport Strategy.

Where tapered edge road tables are used, the edge of carriageway road markings are particularly important in directing cyclists to cross the table rather than to use the kerbside gap. Tapered edge table schemes that specifically allow for cyclists to by-pass the table are likely to require a minimum gap of 750mm at the kerbside.

All kerb to kerb tables are potential pedestrian crossing points. Tactile paving represents a physical warning to the visually impaired that there is a dropped or flush kerb, and without this warning a blind person could walk into the carriageway. Therefore **two tile widths of modified blister tactile paving slabs should be provided on the footway at the kerbside of all kerb to kerb road tables, except where the table is a side road entry treatment. In this case it should be treated as an in-line uncontrolled crossing and three tile widths of modified blister paving should be provided.** This guidance is in accordance with [DfT Guidance \(1998\)](#). (See also [Road Users with Mobility Impairment](#)).

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Entry Treatments

This technique generally involves narrowing the entrance to a minor road at a priority junction and incorporating a ramp that raises the highway to the level of the footway. The speeds of turning vehicles are reduced, drivers are made aware of a change in the character of the road and the safety of pedestrians crossing the mouth of the junction is improved.

There is no definitive policy statement relating to entry treatments, and proposals for their use should consider fully site conditions and potential accident savings. At any particular site, the benefits to pedestrians from the introduction of an entry treatment must be balanced against the possibility of introducing shunt-type accidents as a result of vehicles braking excessively in order to make the tight turn into the treated road. Moving the entry treatment further into the minor road can reduce this likelihood but will also move it away from the pedestrian desire line.

Despite some concern that the very young and the very old may believe kerb to kerb road tables and entry treatments give priority to pedestrians over traffic, there is no reported accident problem. Road safety education is being used to clarify the situation whilst stringent application of policy and good practice should also assist. A black asphalt table with white edge of carriageway markings will more indicate that there is no pedestrian priority than a table constructed in (say) red block paving contrasting with the rest of the carriageway.

Although pedestrians on the flat top of a road table are crossing at the point of lowest vehicle speed, any evidence that confusion over priority has caused personal injury accidents will demand a further review of good practice guidance.

([TA leaflet 2/94: Entry Treatments](#))

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Rumble Strips and Rumblewave surfacing

The [Highways \(Traffic Calming\) Regulations 1999](#) allow local authorities to construct rumble devices on the highway. This means that part of the carriageway is constructed in a material intended to generate noise or vibration in a vehicle passing over it. They are used to alert drivers in advance of a hazard such as a bend.

Rumble Strips

Experience elsewhere suggest that these result at best in only marginal speed reduction and this is outweighed by the environmental cost in terms of noise and vibration. Some drivers perceive the noise and vibration effect to be reduced at faster speeds and accelerate accordingly. Conversely, a lesser number pass over them very slowly and this diversity in adopted speed is a potential hazard. The DfT have stated that some authorities do not permit the use of rumble strips within 200m of any residential property but the noise generated can travel much further depending on local circumstances and particularly at night.

Due to the lack of speed reduction effect and generated noise, rumble strips are not recommended as a speed reduction measure in traffic calming schemes.

Rumblewave surfacing

This product has been developed with the idea of restricting the noise and vibration effect to within the vehicle so that there is minimum effect on the surrounding environment. Nevertheless, there have been complaints about noise and vibration by residents where rumblewave surfacing has been introduced..

DfT advice is that rumble wave surfacing should not be introduced within 30m of property, nor within 15m of any junction for the safety of two wheeled vehicles,

Initial trials have shown a 54% personal injury accident reduction which demands further consideration but only a 3.5% average reduction in vehicle speeds.

Due to the lack of speed reduction effect, rumblewave surfacing is not recommended as a speed reduction measure in traffic calming schemes. However, given the possible accident reduction potential, rumblewave surfacing could prove useful as an alerting device ahead of a hazard, where proximity to property is not an issue. More prescriptive advice will be developed when more data is available but until then rumblewave surfacing should be introduced with caution, only in appropriate circumstances and monitored closely.

For further information on Rumblewave surfacing please see the [DfT Traffic Advisory Leaflet 1/05](#).

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Road Cushions

The road cushion has increasingly been used in the UK and is a narrow hump that effectively allows vehicles with wide wheel tracks to pass unhindered but slows smaller vehicles including private cars.

In Europe, road cushions have been used to allow a smooth ride for bus passengers while at the same time have a 'calming' effect on most other vehicles.

The main problems with the use of cushions in the UK relate to:-

(a) the widespread introduction of minibuses which have twin rear wheels on one axle which effectively narrows the wheel track to a similar width to that of a private car. ie for cushions to be effective in reducing the speed of cars there will also be some effect on minibuses.

(b) cushions which are too narrow can introduce a risk of grounding

(c) on-street parking can prevent buses from straddling the cushion. A single parked vehicle can nullify all benefit to bus passengers.

(d) the gap at the kerbside of a cushion, while allowing cyclists to pass unhindered, is also intended to be the nearside wheel track of vehicles straddling the cushion and this can cause difficulties for cyclists.

(e) cushions do not directly assist pedestrians crossing and must be offset from any pedestrian crossing facility (such as a dropped kerb and / or refuge) in order to allow pedestrians with mobility difficulties to cross in relative ease.

Despite these difficulties, the Passenger Transport Group support the road cushion concept which promotes the use of public transport and provides an alternative to road tables on bus routes.

The use of road cushions should be confined to bus routes, preferably in combination with road tables. The proportion of cushions to tables should be dictated by local conditions, balancing the frequency of bus services, the likelihood of on-street parking and degree of pedestrian activity.

In accordance with DfT advice, **the maximum height of a road cushion is 75mm**. The optimum width of a cushion is approximately 1.65m, although this should be a matter for consultation with the relevant bus operators. The gap between cushion and kerb and between adjacent cushions should ideally be 1.0m, and no less than 750mm. Gaps which are too wide encourage drivers to drive through the gap at speed without the risk of grounding. Comprehensive guidance on recommended road cushion dimensions is provided in [TA leaflet 4/94: Speed Cushions](#).

[\(TA Leaflet 1/98: Speed Cushion Schemes\)](#).

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Thumps

These are low narrow humps which have been installed at regular intervals as an alternative to other forms of hump. They are not recommended as it has been found that often drivers do not reduce speeds as they experience no increase in discomfort at faster speeds and increased bus maintenance costs have been reported.

[\(TA leaflet 7/94: "Thumps" Thermoplastic Road Humps\)](#)

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Raised Rib Markings

[TA leaflet 2/95: Raised Rib Markings](#) describes this measure and no specific additional guidance is provided. It is worth highlighting that they can provide difficulties for two-wheeled vehicles and can only be used as an edge marking, not a centreline.

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HORIZONTAL DEFLECTION TRAFFIC CALMING

In comparison with road humps and tables, there is relatively less published data on the effectiveness of chicanes, pinch-points, islands and kerb build-outs, and there has been considerable variation in the horizontal deflection techniques used. In general, the available evidence suggests that if the aim of a traffic calming scheme is to reduce speeds to below 20mph then it is unlikely that this can be achieved by the use of horizontal deflection techniques only.

Public attitude surveys of schemes in Surrey suggest that in general residents believe that vertical deflection traffic calming schemes are more beneficial than horizontal deflection schemes, although this may more reflect their views on the individual schemes involved. National research also suggests that in general the public prefer vertical deflection rather than horizontal deflection schemes.

[\(TA leaflet 9/94: Horizontal Deflections\)](#)

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Chicanes

These involve building out the kerb, usually on alternate sides of the road, to effectively introduce bends into an otherwise straight section of carriageway.

This technique can allow two vehicles to pass or permit single vehicle flow only. With the latter, signing can give priority to one direction of flow or alternatively no signed priority relies on inducing driver caution to achieve speed reduction.

An important design element is ensuring that the severity of the bend(s) through the chicane allows the safe passage of all non-prohibited vehicles. The speed reduction effect of a chicane that allows passage for the largest vehicles is likely to be greatly reduced for cars. For example, the speed reduction effect of the chicane system introduced in Albert Drive, Woking has been reduced in order to allow bus passage.

An essential aspect of the Albert Drive chicane scheme is the cycle track. This has been constructed off the highway, which prevents cyclists from coming into conflict with motor vehicles in the chicanes. Cyclists are vulnerable at pedestrian refuges and similar problems can occur with horizontal deflection traffic calming measures that are generally based upon reduced road width and the introduction of tight bends. Every opportunity should be taken to provide cycle bypasses where horizontal traffic calming narrows the available carriageway width.

In certain circumstances, on-street parking can be used to assist in the speed reduction effect. Protected parking bays can be created by kerb build-outs which narrow the carriageway and the chicane effect can be achieved by alternate kerb build-outs, providing additional protected parking bays. Apart from other safety engineering considerations, there are implications on the existing on-street parking provision and this should be emphasised during consultation.

A chicane scheme in Cleeve Rd, Leatherhead was removed (and replaced by a vertical deflection scheme) as it proved unpopular with residents who viewed the scheme to be ineffective and a hazard. It is essential that residents are made aware of the possible chicane design options during consultation. However, even with a favourable consensus, residents' views may change following implementation and great care must be taken to ensure that the particular chicane design is appropriate to the location. Such consideration will include traffic flows and speeds, cyclists, parking, pedestrians, land use (and if available, the use of data from similar chicane systems elsewhere). In Cleeve Rd the chicanes were located along only a short section of the road and off peak low traffic flows minimised the speed reduction effect which was partly dependent upon an opposing traffic flow.

An advantage of the Albert Drive scheme is that it allows simultaneous passage to both directions of traffic and its speed reduction effect does not rely on the caution induced in the opposing flow. This design with a central island has proved successful in reducing vehicle speeds to below 30mph while allowing bus passage, and could be useful in similar circumstances. In general, it is recommended that chicanes allowing two-way traffic flow incorporate a central island or pedestrian refuge. Otherwise during low traffic flow conditions, vehicles are able to take the fastest line through the chicanes with minimal speed reduction.

[\(TA leaflet 12/97: Chicane Schemes\)](#)

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Pinch-points or Throttles

This measure involves kerb build-outs on opposite sides of the carriageway to narrow the carriageway to just allow two vehicles to pass or more commonly to allow single vehicle flow only. As with chicanes, signing can give priority to one direction of flow or alternatively no signed priority relies on inducing driver caution to achieve the necessary speed reduction. In either situation, a throttle in isolation will only influence vehicle speeds in the immediate vicinity of the throttle. The narrowed carriageway assists crossing pedestrians and the speed reduction effect can be increased by raising the throttle on a road table.

Throttles which allow two-way traffic flow vary in effectiveness dependent upon the degree of narrowing and traffic flows. On quiet residential roads two-way throttles are less effective particularly in periods of low traffic flow with vehicles able to straddle the centreline with minimal speed reduction. In such circumstances it also may be beneficial to locate the throttle on a road table.

For single-way throttles and chicanes to be effective, traffic flows must be substantial enough to slow traffic without being too great to cause excessive queues and driver irritation. Also, the traffic flows in each direction should be approximately equal. With relatively small flows and random arrivals, it is unlikely that an unraised single-way scheme can be effective for much of the 24 hour day. The limited data available from elsewhere has confirmed the lack of speed reduction achieved during periods of low traffic flow. In contrast, during peak hours there have been problems with congestion and long queues with the observation that this type of measure can reward aggressive driving behaviour.

In view of the difficulty in ensuring the necessary traffic flow conditions, chicanes and pinch-points which allow only single-way traffic flow are not recommended unless raised on a table or within a series of other measures where the speed reduction effect is ever present. The long term acceptability of traffic calming may depend upon the development of effective horizontal deflection measures.

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Islands / Hatching

Traffic islands and pedestrian refuges, together with hatched road markings, can be useful in controlling vehicle speeds by narrowing the effective road width and preventing overtaking. These techniques have been used to reduce speeds on wide roads where vehicle speeds are far in excess of the 30mph speed limit.

By reducing road width, speeds can be significantly reduced although additional measures would probably be required to reduce speeds to below 30mph. Cycle lanes may be a preferred option to narrow the effective road width for motor vehicles, whilst providing some protection for cyclists, who might be 'squeezed' by a central island. (See [Road Widths at Horizontal Deflection traffic calming](#)).

([TA leaflet: 7/95: Traffic Islands for Speed Control](#)).

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Gateways

Gateways are used to indicate to drivers where the road changes character, for example at the start of a traffic calming scheme or at the entry to a village. Although this can involve some narrowing of the carriageway (effectively a two way throttle), gateways are not a width restriction and must allow access to any vehicle entitled to use the road.

Research ([TA leaflets 13/93 Gateways](#), and [1/94: VISP – A Summary](#)) suggests they can be effective but only when combined with proven speed reducing measures. Otherwise, results indicate that any speed reduction achieved is confined to the close proximity of the gateway itself and to the short term.

The benefits of measures designed to alert the driver (such as gateways, rumble devices and change of road surface) are dubious in the longer term and particularly where most drivers are either local or regular users of a route. Therefore, gateways should not normally be used in isolation. It is recommended that they are only used to complement more effective speed reducing measures.

Depending upon the nature of the proposed gateway it may be necessary to gain planning permission in order to erect a gateway. The District Planning Officer should be consulted as early as possible, particularly if the proposed gateway is in a conservation area.

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Road widths at horizontal deflection traffic calming

As has been stated, the speed reduction effect of horizontal deflection traffic calming is dependent upon the effective road width and is limited by the need to allow the passage of all non-prohibited vehicles and to provide for the safety of cyclists.

For a cyclist to be safely overtaken, the width required depends upon the width of the overtaking vehicle but in general a lane width of 4m is needed. For widths of between 3 and 4m the cyclist will be 'squeezed'. Road widths less than 3m ensure the overtaking vehicle must wait behind the cyclist.

Therefore at pinch points and islands, a lane width of between 3 and 4m should be avoided.

Separate cycle lane or cycle bypass provision is advised where at all practicable but this may not always be possible.

The above remains guidance but it should be noted that the minimum acceptable lane width that would allow all types of vehicle (apart from agricultural vehicles) to pass is approximately 2.75m.

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Change of Road Surface Colour

The use of a colour contrast has been used to induce driver caution or increase awareness, particularly at the point of entry to a sensitive environment or to highlight a particular feature. Unlike rumble devices, a change of surface should cause no noticeable increase in noise or vibration.

There is an existing [County policy on the use of coloured surface treatment](#), the main principles of which are:-

Coloured surface treatment should not be used unless it can be clearly justified on the grounds that it enhances the effectiveness of a scheme.

In such circumstances, the following convention should be adopted:-

GREEN – for cycle facilities

RED – any other traffic management purpose

No other colours should be used.

The full detail of this policy also outlines the performance requirements of any coloured surface used and the relevant factors when the application of colour is being considered.

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Overrun Areas

[TA Leaflet 12/93](#) deals with overrun areas and there are no additional County criteria for their use, other than to emphasise the importance of the design considerations laid down with relation to pedestrians and cyclists.

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Other Variations

Combination schemes

The choice of traffic calming technique is dependent upon the required design speed and the site characteristics. Existing traffic calming schemes in Surrey have generally used the same measure, usually humps or tables, in series. Some drivers have given the view at public consultations that a long series of road humps / tables causes additional irritation through being tediously boring. Whilst there is no evidence to suggest that schemes employing a variety of different techniques are more effective, 'combination' schemes may be less frustrating to drivers and contribute to the calming effect.

A more tangible benefit could be that using horizontal deflection calming measures or road cushions within a series of road tables may allow the number of tables to be reduced. This could increase the acceptability of a scheme to bus operators and the emergency services.

Giving due consideration to design speed and the local environment, soundly based 'combination schemes' employing more than one calming technique are encouraged, particularly on bus routes.

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20 mph Zones and 20mph Limits

Local authorities are now empowered to introduce their own 20mph speed limits and zones. 20mph zones are enforced by traffic calming whilst 20mph limits are just signed. Previously a 20mph zone would not have been authorised by the DfT if the average speed at a [representative site](#) within the zone was in excess of 20mph.

According to design advice issued by the [DfT\(TA leaflet 9/99\)](#), a 20mph speed limit is inappropriate where the 85%ile speed is in excess of 24mph. In effect, both these speed requirements are the same, making it logical that the speed criterion for 20mph zones and 20mph limits should also be the same.

Subsequently [DfT Circular 01/06 Setting Local Speed Limits](#): relaxed this guidance to allow average speeds of 24mph, 85%ile speeds of 28mph, and therefore some speeds in excess of 30mph. Surrey have rejected this new guidance as it is felt that this brings 20mph limits into disrepute and is counterproductive. This decision is further explained in [Surreys response to DfT 0106 Speed Limit Review](#).

Therefore, **a 20mph zone or limit will only be authorised if the average free flow speed at a representative site does not exceed 20mph.**

In engineering terms, a 20mph zone is effectively an area with a design speed of 20mph or less. It is a matter of judgement whether there is any advantage in making a formal 20mph zone where, by definition, average traffic speeds have been reduced to this level anyway due to a combination of existing road geometry and traffic calming measures.

The main perceived benefit of the creation of formal 20mph zones is environmental with the relaxation of certain criteria. In particular whilst all entry points must be signed, it is permitted to reduce the necessary signing within a zone, which can be especially relevant to conservation areas. The acceptability of any relaxation should not automatically be assumed. Each zone will be assessed on its individual merits by Safety Audit and safety must not be compromised.

It is also important to appreciate that the introduction of a 20mph zone requires that the speed criterion is satisfied on all roads within a zone. In some cases where there is a natural zone boundary additional measures may be required on roads which otherwise would not justify treatment, thereby increasing costs.

Speed surveys at traffic calming schemes in Surrey (and elsewhere) have not provided definitive specifications for the necessary spacing between measures to satisfy the speed criterion for the creation of 20mph zones. However, speed investigations do suggest that a spacing of 45m between road tables would have been required to ensure that a 20mph zone could hypothetically have been created in Feltham Hill Road, Ashford. On such a long straight road, the number of tables needed to achieve this objective would be excessive and incompatible with the needs of the bus operators and emergency services. 20mph zones are most easily created in residential areas where existing speeds are at least partly restrained by road geometry.

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Necessary Design Considerations

Safety Audit

All traffic calming schemes will be subject to assessment by the Safety Audit procedure. The remit of Safety Audit is to ensure the safety of schemes. Basic adherence to regulations does not guarantee Safety Audit approval and it is essential that all safety aspects of a scheme are addressed at each stage of this process.

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Suitable Materials for Traffic Calming Schemes

A study was commissioned in June 1994 to investigate materials used in the construction of traffic calming measures, particularly tables and humps. The purpose of the study was to explore the types of material available, assess performance and determine the most appropriate materials to be used. This involved the collection of data from existing traffic calming schemes in Surrey and elsewhere and from manufacturers. Further research has since been carried out which has served to reinforce the results of previous work.

The following policy statements in relation to materials suitable for use in traffic calming schemes have been developed:-

All ramps to road tables should be constructed in black asphaltic material.

White arrowhead markings must be provided on all ramps.

The flat tops of all road tables should be constructed in black asphaltic material.

White edge of carriageway markings must be provided on all road tables

In all cases, the materials used must satisfy the Surrey County Council standard in relation to the skid resistance and polished paver value (PPV) for the type of road involved.

In normal circumstances, the necessary funding will provide for the construction of purely asphaltic road table construction. Any departures from this policy should be subject to consultation with Transport Strategy.

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Rubber-based products

In relation to the use of segmented rubber road tables / cushions, the following procedure should be adopted:-

- (a) The manufacturer must provide evidence of the durability of appearance and effectiveness in the form of references from other local authorities
- (b) If this is satisfactory, the product may be shown as an option (alongside an asphaltic alternative) at public exhibition
- (c) Responding directly affected residents must indicate a preference for the rubber-based product over the asphalt

Only in these circumstances should the use of rubber-based traffic calming units be permitted.

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Conservation Areas

The responsibility for 'preserving conservation area status' is spread impartially among all local authorities and Highway Authorities. The District Planning Officer must be satisfied that the proposed traffic calming measures and materials are appropriate to the conservation area status. It is important that agreement is reached as early as possible in the preliminary design process and in particular before public consultation.

There are various TA leaflets which outline schemes in historic towns:-

[1/96: Traffic Management in Historic Areas](#)

[10/97: Halifax Historic Core Zone](#)

[2/98: Lincoln Historic Zone](#)

[8/98: Shrewsbury Historic Core Zone](#)

[13/99: Historic Core Zones: Bury St Edmunds](#)

In conservation areas, only measures and materials agreed with the Planning Authorities must be presented as possible options for public consultation.

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Road Users with Mobility Impairment

Local access groups should be contacted as part of the main consultation process. All existing feedback received from access groups has been strongly in favour of flat top road tables in preference to round top road humps. Drivers with disabilities believe tables to be more comfortable and the flat table offers easier crossing for pedestrians with pushchairs and other mobility difficulties, in particular wheelchair users.

As previously stated, a double width of modified blister tactile paving slabs should be provided on the footway at the kerbside of the flat tops of all kerb to kerb road tables, except when used as an entry treatment when three widths should be used. These should be buff or in such a colour (not red) which provides a contrast with the footway surface material and the preferred black asphaltic flat top of the road table. It is not required to provide further tactile paving away from the kerbside. This configuration provides the visually impaired with adequate warning of the flush kerb yet avoids an excess of tactile surface that can present problems to people with other mobility problems, such as arthritic conditions.

All kerbs at the edge of the footway should be flush with the flat top of a road table. For further delineation it is essential that white edge of carriageway markings are provided.

The only circumstances where tactile paving should not be provided at all points where the footway meets a kerb to kerb road table is where the table is located at a junction and pedestrians are to be discouraged from crossing. For example, at a T-junction, the use of tactile paving on the footway directly opposite a minor road would encourage blind persons to cross into the mouth of the minor road. To prevent this occurring at a junction table, in the absence of tactile paving, appropriate guardrailing or a minimum upstand of 25mm must be provided. With the latter, the use of bollards is recommended and these should be spaced so as not to impede the desired line of pedestrian travel.

In more general circumstances, if the kerb at a kerb to kerb road table is unusually high (or a road table low) then the kerb should be locally lowered in order to be flush with the table, and tactile paving provided. If, such local adjustment is not practicable, then the use of an upstand as applied above without tactile paving may be the preferred solution.

Where a traffic calming measure incorporates a flower pot or planter, this must not mask a small child at the kerbside. Based upon standards employed elsewhere, the height of any such kerbside obstruction must not be greater than 450mm and it is essential that the growth of any plants and flowers does not exceed this specification. This may best be achieved by careful initial choice of plant rather than by reliance on periodic pruning or trimming. The low height demands the provision of a clear colour contrast between the pot and the footway and an appropriate corduroy tactile warning.

Guardrailing or bollards provide a physical barrier which also offers protection to pedestrians from turning buses and heavy goods vehicles as drivers of such vehicles may unwittingly allow their trailing wheels onto the footway. If bollards are used for this purpose, they must be no less than 1m in height and must incorporate a clear colour contrast around the top to assist the visually impaired.

Bollards, as so defined, are higher than planters and great care is necessary to ensure that they cannot mask a small child at the kerbside, either through their design or spacing. The principles of using any kerbside physical barrier are outlined in [DfT Traffic Advisory Leaflet 4/93 Pavement Parking](#) and must be applied to the use of bollards, railings and planters within a traffic calming scheme.

Traffic calming, by creating a safer environment for vulnerable road users, should generally bring benefit to people with mobility difficulties. However, any potential traffic calming scheme could present difficulties to particular individuals in the local population. It is essential that any such problems are addressed as early as possible during the development of the scheme. This underlines the importance of effective consultation.

The standard document to ensure design fully considers the mobility impaired is the DfT document [Inclusive Mobility](#) and this should be referred to at all times.

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Lighting

Road hump regulations state that, other than in 20mph zones, lighting should extend over the length of road containing humps. This must consist of at least three street lamps placed not more than 38m apart, or the lighting should comply with BS 5489.

The Institution of Lighting Engineers (ILE) has produced its own standard for lighting traffic engineers and this information provided in [DfT LTN 1/07](#) under section 2.8.4 should be complied with.

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Noise

It has been suggested that traffic calming can increase traffic noise. However, surveys carried out in Surrey to attempt to quantify the changes in traffic noise as a result of the introduction of tables and humps have proved inconclusive. This has been for a number of reasons but particularly due to the wide variation in driver behaviour observed.

([TA leaflet: 6/96: Traffic Calming: Traffic and Vehicle Noise](#)) and [TA leaflet 10/00: Road Humps: discomfort, noise and ground-borne vibration](#)

Other variables include traffic conditions, road surface characteristics, parking and congestion, whilst noise levels from similar types of vehicle were often very different. Also, traffic noise measurements are made using the dB(A) unit which is weighted to suppress the lower frequencies such as the 'roar' arising from an accelerating rear engine diesel bus. Apart from the difficulty in calibrating any results, a quantitative measure of annoyance based upon the dB(A) would therefore likely be an underestimate for large diesel powered commercial vehicles.

Nevertheless, the recorded maximum instantaneous noise levels were associated with rear engine diesel buses moving off on the exit ramp of road tables and heavy vehicles with unrestrained loads 'jumping' while crossing the hump or table.

Where buses and heavy goods vehicles occur in traffic flows they usually represent the dominant noise source and an increase in the maximum noise level from cars and light goods vehicles is unlikely to cause a noise problem. Nevertheless, a change in tonal quality (such as the 'thwack' of a tyre or suspension squeak) from a car or van could cause annoyance.

The annoyance caused by noise is subjective. Directly affected residents in both Cumberland Avenue (round top humps) and Feltham Hill Road, Ashford (tables) were asked whether traffic calming had changed the level of traffic noise, but overall the results were inconclusive. In Feltham Hill Road, the majority (55%) either were unsure or felt that traffic noise had not changed, whereas 29% and 16% felt that it had increased and decreased respectively.

In Cumberland Avenue however, 63% of responding residents believed traffic noise to have reduced. This is likely to be mainly due to the perceived overall noise benefit as a result of much reduced traffic flow rather than any effect on the instantaneous noise levels of individual vehicles.

It is only possible to reach the general conclusion that, in certain circumstances, the increase in noise emitted from heavy goods vehicles and buses could constitute a noise problem. From observation, the greatest influence on traffic noise is driver behaviour with excessive braking and acceleration being a particular source of noise nuisance.

The surveys have not clearly established whether it is the speed at or speed between measures that is the major noise source. Therefore in order to minimise traffic noise it is firstly necessary to ensure that a traffic calming scheme induces a steady speed between measures as excessive spacings and steep ramp gradients could encourage more braking and acceleration by some drivers. Although a degree of braking and acceleration is unavoidable, site observations suggest that this can be limited by less steep ramp gradients and reduced spacings.

Traffic calming schemes must encourage steady speeds and it is recommended that measures should be located at a maximum distance from the sensitive rooms within residential property.

Generally, to minimise the effect of tyre 'thwack', it is recommended that vertical deflection traffic calming measures be located a maximum distance from the sensitive rooms (defined as living rooms and bedrooms) of residential property. Individual noise levels reduce rapidly with increased distance from source and noise becomes particularly important when houses are not set back from the road, and where there are no noise barriers such as walls or hedges. Measures near bungalows with ground floor bedrooms fronting the carriageway should be particularly avoided.

Although no definitive guidelines regarding noise have been established, designers should be aware of the possibilities. A traffic calming scheme may cause traffic to divert from a road with residents perceiving an overall reduction in traffic noise. This does not preclude possible problems from individual vehicles particularly buses and heavy goods vehicles.

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Pollution

There is no definitive data evaluating the effects of traffic calming on pollution levels. Whilst the polluting effects of motor vehicles are known, it is impossible to isolate any effect of traffic calming on pollution levels because of the effects of other variables such as weather conditions, other pollution sources and vehicle characteristics. However, in general removing traffic (and associated harmful emissions) from residential roads should not worsen conditions in the residential environment.

This view is supported by DfT guidance which acknowledges that traffic calming can increase emissions per vehicle but is unlikely to result in poor air quality and any effect is offset by an average 25% traffic diversion. Also traffic levels in residential areas tend to be relatively small resulting in less impact than in more congested urban areas.

Some traffic calming schemes do not seek to shift traffic and if badly designed, might also involve more vehicle queues and increased braking and acceleration. This emphasises the importance of good design to induce steady vehicle speeds.

Overall, it is likely that the largest influences on pollution levels are the volume and composition of traffic flow, and driver behaviour. In the longer term, the actions of government and the willingness of the motor industry to develop and use cleaner fuels and vehicles are likely to be the biggest influences on pollution levels.

([TA leaflet 4/96: Traffic Management and Emissions](#))

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Vibration

Soil type, vehicle flow composition and distance from source are the main factors affecting vibration. Generally, the absence of 'before' data has meant the precise effects of a new scheme are difficult to gauge but DfT guidance suggests that there is very unlikely to be a risk of even minor damage to property as result of introducing road humps or cushions.

([TA leaflet: 6/96: Traffic Calming: Traffic and Vehicle Noise](#)) and [TA leaflet 10/00: Road Humps: discomfort, noise and ground-borne vibration](#)

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Local Factors

Traffic calming should be designed with due regard to the existing local functions of the road. This should include consideration of adjacent land use, bus stops, lay-bys, parking, crossovers, dropped kerbs, footways, public utilities, street furniture and drainage.

For example, at a rural calming scheme in Surrey, in the absence of a footway and a kerb, some drivers chose to avoid a road table scheme across a village green by driving partly across the grass verge. Apart from damage to the green, vehicles 'collected' mud and deposited it further along the road so causing an additional hazard. Possible solutions in such circumstances include the provision of a kerb locally or kerbside bollards.

The white arrowhead markings on the ramp of a road table or hump are an essential warning to drivers and must be clearly visible. White arrowhead markings should be carefully located, on-street parking could mask this important warning for approaching drivers. Similarly, worn arrowhead markings must be renewed.

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STAGE 5 - FULL CONSULTATION

All individuals and organisations that are directly affected by traffic calming proposals must be consulted. Due consideration should be given to all views received, and the scheme amended where appropriate.

The previous sections have outlined the process by which a preliminary traffic calming scheme should be developed. The next necessary stage is to carry out comprehensive consultation initially with relevant organisations and then with residents.

In general, traffic calming will have a permanent effect on the lives of residents by influencing driver behaviour in the immediate vicinity of their dwellings. It is this proximity and direct effect on the lives of residents which makes effective consultation so important. Most affected road users will be local and it is essential that the scheme evolves to the satisfaction of those people directly affected by it.

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Statutory Consultation

The Highways Act 1990 requires the local authority to consult with the police and to advertise proposed road hump schemes. Specifically, the Highways Act 1981 Section 90C states in relation to advertising that the local authority shall -

'publish in one or more newspapers circulating in the area in which the highway concerned is situated, and place at appropriate points on that highway, notice of the proposal stating the nature, dimensions and location of the road hump and the address to which and the period within which objections to the proposal may be sent. The period stated in the notice shall be not less than 21 days beginning with the date on which the notice is first published.'

In addition, the Highways (Road Humps) Regulations 1996 require the fire and ambulance services to be consulted, as well as organisations or groups representing people who use the road.

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Consultation with Organisations

It is essential that any fundamental difficulties have been overcome through **preliminary consultation**. Following the formulation of an outline scheme, it is then necessary to consult affected organisations to ensure that subsequent public consultation is carried out on a scheme that is acceptable to all other parties. Failure to do this could result in additional public consultation should a technically necessary amendment to the scheme be required. It is particularly important that the scheme receives Stage 1 Safety Audit approval before public consultation.

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List of consultees

Including preliminary consultees, the list below is a guide to those who represent people and organisations whose formal views are likely to be relevant to the development of a scheme:-

Ambulance Service
Fire Service
Police
Bus Companies (via SCC Passenger Transport Group)
Local County Councillor(s)
Local District / Borough Councillor(s)
Automobile Association
RAC
Road Haulage Association
Freight Transport Association
Cyclists Touring Club
Local Cycling Groups
Any affected institutions (eg hospitals)
Residents Associations
Local Access Groups (including any local voluntary blind societies)

Local District / Borough Council
Local Parish Council
District Planning Officer
Local Chamber of Commerce / Traders organisations
Adjoining authorities
All schools affected*

Surrey County Council officer consultations:

Transport Strategy
Safety Audit
Asset Management (maintenance programme)
Cycling officer
Safer and Smarter Travel*

* Where appropriate, through liaison with Smarter and Safer Travel and schools, 'safe routes to schools' projects should be encouraged and incorporated into the preliminary proposals.

For schemes in rural areas, the National Farmers Union (SE Regional office) should be consulted to safeguard the permitted movement of agricultural vehicles.

All responses should be fully considered and the scheme amended to take account of reasonable objections and comment. Reasons, technical or otherwise, for not acting upon any such comments should be recorded.

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Public Consultation

The preliminary scheme (amended if necessary) must be subject to public consultation. This should involve the distribution of leaflets (containing a questionnaire and pre-paid postage return envelope) to all properties (not just residential) within the area affected by the scheme, not just those roads where measures are proposed. Where schemes involve schools, it is recommended that leaflets are distributed to all pupils to reinforce the door to door delivery.

The leaflet should also advertise a public exhibition to be held within the area for at least one period during the working day, plus an evening and a Saturday. The exhibition should be manned by officers able to explain all aspects of the scheme, including the benefits and disadvantages of proposals. In particular the leaflet (and exhibition) should inform of any implications on bus services and emergency service response times and illustrate the 'design' speeds where traffic calming is proposed.

This guidance should enable the public to be informed of the [materials](#) likely to be used in a scheme and thereby minimise debate on aesthetics. However, as previously stated, in conservation areas only measures and materials agreed with the Planning Authorities must be presented for options at public consultation although this constraint must never compromise the road safety objective.

The public exhibition should be publicised through posters within the study area on notice boards, in shop windows and if necessary on street furniture. A press release to the local newspapers should advise residents of the exhibition and the proposals.

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Questionnaire

This should be worded to obtain maximum response, and be simple to understand and make analysis easy. It should include a general question seeking an overall view on the principle of using traffic calming to solve the problems of the area.

The preliminary nature of the proposals should be emphasised and the importance of the consultation process in developing a scheme acceptable to the local community should be stressed.

No definitive style of question is specified but the questionnaire should lead to unambiguous results which can easily be interpreted and subsequently used to justify scheme amendments at Committee.

It is also important to clearly define the **study area** and note that all residential and business addresses within this area are '*directly affected*' and must be consulted.

These will include '*most affected*' consultees who are those with residential or business addresses in roads where traffic calming measures are proposed. Such responses should be given separate consideration to other respondents as, by definition, '*most affected*' consultees have more to gain or lose as a result of the introduction of a scheme. These views should be given greater weighting in relation to proposals close to their address but have no greater weight than '*directly affected*' respondents views in terms of the principle of whether a traffic calming solution is appropriate or not.

A third tier of response is identified as '*indirectly affected*', defined as responses from addresses outside the study area. Although any such responses should be recorded, in order to maintain the equity of the consultation, these views should not be included in the public consultation response analysis. If in particular circumstances this seems inappropriate then the boundaries of the study area may need re-definition. A pupil (or parent of a pupil) living outside the study area but attending a school in the area is considered to be '*indirectly affected*'.

Only one response per household has been encouraged, and in general this is considered equitable. In the event of opposing views being held by different individuals of the same address then each response should be included in the analysis. With business premises, only one representative response is required.

It is essential that the questionnaire provides a date for final submission of responses and a six week period following the exhibition is recommended. It is important to establish an 'end of consultation' date to allow analysis to commence and to assist in project management.

Open public meetings are not advised as a means of consulting the public. Such meetings can be dominated by vocal minorities and are often conducted in an atmosphere where some residents might be reluctant to express their views. Consequently it can be difficult to communicate all the necessary relevant information and there is a danger that other non-related issues can be raised and given unwarranted consideration. Public meetings are single events not convenient for all to attend and it is difficult to get a representative view of those in attendance.

Having followed the necessary stages of scheme development outlined in this document, the views of all affected organisations and members will already have been incorporated into the preliminary scheme presented for public consultation. At this stage therefore, **in order to ensure equitable public consultation, the response to the questionnaire should be the measure of public opinion.**

Petitions are a recognised form of expressing public opinion. However, the questionnaire obtains individual responses that hopefully will be the result of considering all of the available relevant information. A petition may result from the canvassing of support for one particular viewpoint often with no scope for grey areas, and prospective petitioners are not always fully informed. Relevant petitions should however be considered at the same Committee as the results of the public consultation.

There is a widely held view that residents who are against a scheme are more likely to respond to a public consultation than those who are in favour. Nevertheless, this cannot be assumed and **the results of consultation must indicate a majority of 'directly affected' respondents in favour of the principle of traffic calming in order to justify the further progression of a scheme.**

All questionnaire responses should be fully considered and the preliminary scheme amended to take account of reasonable objections and comment. Reasons, technical or otherwise, for not acting upon any such comments must be recorded.

The results of all consultations must be reported to the relevant Council Committee and Members must approve both the interpretation of the results and any recommendation to progress an amended detailed scheme design.

Residents and all local representatives should be made aware of the results of the consultation, Committee decisions and details of the amended scheme by a letter delivered door to door as per the questionnaire.

It is important that residents are given a realistic timescale of events leading up to implementation. Given the difficulties in gauging future funding priorities and consequently construction dates, public expectation should not be prematurely raised. However, public consultation raises the awareness of residents to a local problem and this in itself can bring benefit. Any unreasonable delay before construction will reduce residents' appreciation of both the problem and the relevance of a traffic calming solution.

'*Most affected*' residents should be informed by letter of any additional amendments necessary arising out of detail design difficulties and be kept aware of the programmed construction date. Basically, the constructed scheme should contain no surprises for affected residents.

The public consultation method outlined above has developed from experience gained in carrying out consultations on many traffic calming schemes in Surrey and should be considered as a 'model' for consultation in the County. However, there can be no ideal consultation and local factors may necessitate a different approach. The model is intended as a comprehensive guide not a definitive methodology.

DfT research indicates that the responses to public consultations tend to more reflect the views of car users and that respondents from non-car households seem most willing to 'leave things to the experts'. The complexity of obtaining a controlled sample is generally considered beyond the scope of the public consultation process, although the possibility of such bias should be noted.

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STAGE 6 - DETAIL DESIGN / CONSTRUCTION

The guidance contained in the previous sections, in particular relating to preliminary design considerations, are also relevant to the detailed design stage. Assuming that all requirements at each stage of the scheme development process have been carefully followed, then this document should not have further implications on its progression to final construction.

In this event, the scheme should require no more than minor amendment at the detail design stage although such change may require further consultation, particularly with '*most affected*' residents. More significant problems encountered during detail design (or following construction) would introduce increased scheme costs, the need for further extensive consultation and delay.

In Cleeve Rd, Leatherhead an experimental chicane scheme was introduced following inadequate public consultation. This resulted in only minimal speed reduction and following a public attitude survey, the scheme was removed. Further costs have now been incurred in developing a more acceptable scheme.

The effectiveness of a scheme and its acceptance by the local population will be proportional to the thoroughness of the investigation and consultation carried out. Any attempt to 'cut corners' during scheme progression is likely to be a false economy, with public dissatisfaction and increased costs being incurred.

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STAGE 7 - MONITORING

All traffic calming schemes must be evaluated against their specified objectives.

It is also necessary to assess the performance of the particular traffic calming design specifications and public acceptance.

Traffic calming is still developing and, with the use of innovative techniques, some schemes will inevitably be more successful than others. It is important that lessons are learnt and comprehensive 'before' and 'after' monitoring should be carried out.

This involves an evaluation of each scheme based upon the originally identified problems and **the scheme objectives**. Most commonly this will include an assessment of accidents, speed and traffic flow on all affected roads.

Accident data should be carefully monitored to assess the performance of the scheme and to ensure no particular aspects of scheme design have caused problems. It is recommended that an interim 'after' study be carried out twelve months after the introduction of the scheme and a comprehensive 'after' study is required when three years accident data becomes available. This latter study should include full 'before' and 'after' evaluation of the scheme and an assessment of the techniques used.

Standard DfT radar speed survey methodology ([TA 22/81](#)) should be used and 'before' surveys should be planned to allow easy comparison with 'after' study surveys. For example, the location of a 'before' survey at the fastest point in a road may coincide with a proposed road table. In such circumstances, the 'before' speed would need to be compared with the average of the speed at the table and the speed at the fastest point on the approach to the table.

Traffic flow data should be collected from all affected roads and it is particularly essential that 'before' traffic data is collected for all roads where traffic volumes might change. This is because the introduction of a traffic calming scheme could result in complaints from residents of diverted traffic which may or may not be valid.

'Before' and 'after' traffic surveys should be carried out preferably during 'neutral' traffic months but certainly during school term time and at comparable times of the year. Care should be taken to ensure that typical traffic flows are obtained, unaffected by roadworks or other abnormal circumstances.

Traffic volume data requirements will vary dependent upon the site characteristics and scheme objectives. However, typically 24 hour automatic counts along links and peak hour turning counts at affected junctions might be appropriate. In some circumstances, additional surveys, identifying particular vehicle classifications, pedestrian movements, noise and parking surveys, may also be required.

Where there is a perceived problem of rat-running traffic, this is best confirmed by a peak hour origin and destination (registration plate trace) survey. The effectiveness of any subsequent traffic calming scheme in removing such traffic can then be assessed by repeating this survey during the 'after' study. The relevance of origin and destination surveys is illustrated by surveys carried out in Feltham Hill Road, Ashford. Although following the introduction of a traffic calming scheme the overall traffic flow decreased during the peak hours, perhaps surprisingly the number of identified through-trips increased.

Although prior public consultation may indicate strong support for a traffic calming scheme, residents' views may change following its introduction. Local acceptance is an essential element in the success of a traffic calming scheme. Strong local opposition is likely to be easily gauged from increased correspondence, feedback from Members or through petition, and require detailed investigation with a view to possible remedial action that will not compromise the objectives of the scheme.

Experience from existing schemes in Surrey suggests that feedback is only rarely favourable with residents less likely to make known their support for a scheme.

Public attitude surveys carried out on traffic calming schemes in Surrey produced very different results. In Cumberland Avenue, Guildford, 83% of responding residents believed that their traffic calming scheme was beneficial whereas only 18% of residents in Cleeve Road, Leatherhead felt similarly. Minimal feedback had previously been received from Cumberland Avenue residents and whilst there had been some negative feedback on the Cleeve Road scheme, in both cases this did not reflect the strength of feeling of residents revealed by the public attitude survey.

The advantages from the above examples are clear. In order to determine more reliably the level of local acceptance of a traffic calming scheme, a public attitude survey is recommended.

This survey should normally be in the form of a questionnaire (with prepaid postage return envelope) delivered to all affected properties during the second year following scheme completion. Where there is clear local concern, further investigation with a view to remedial action should be considered.

The onus for carrying out all monitoring as advised within this section lies with the relevant Local Highways Manager. All results of monitoring should be supplied to the Transport Strategy Team to ensure the continuing review of traffic calming good practice in Surrey.

The technical justification of any aspect of a scheme should be made available to Transport Strategy on request. Ideally, a technical report including all aspects of scheme development and all results of monitoring would be produced. This should not mean additional work, but would provide a reliable record of events and will further assist in the continued development of traffic calming good practice.

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INNOVATION

Home Zones

The basic principle behind home zones (HZ) is that engineered very slow speeds enforce equal priority for all road users. The broader intention is to create safer and more convivial communities by educating motorists that a HZ is intended for purposes other than passage.

Surrey made a successful bid to fund a HZ in Nutley Lane, Reigate as part of the DfT's HZ Challenge. Relevant findings include:-

- HZs are expensive with the additional consultation bringing greater resident participation in the finer points of design and aesthetics.
- One of the major principles of HZs is shared space and the removal of the kerb. This was viewed as a major problem for the mobility impaired who require a clear designated path along a road, safe in the knowledge that they will not encounter traffic or physical obstruction.
- The effect on available parking space is a major concern of residents.

These factors , together with concerns of how to ensure drivers adopt walking speeds without an enforceable (5mph) speed limit, suggest further 'retro-fit' HZs should not be promoted at this time but there may be some future for new-build HZs where design is not limited by existing street geometry.

Further information on HZs can be obtained from the DfT at <http://www.dft.gov.uk/pgr/sustainable/homezones/>

And from the Institution of Highway Incorporated Engineers (IHIE) at <http://www.homezones.org.uk/>

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Quiet Lanes

This is the brand name given by the DfT to an initiative aimed at making narrow rural lanes safer for all users but in particular for pedestrians, equestrians and cyclists.

Surrey have carried out a lot of work in this area and good practice guidance can be found on the website at [Country Lanes in the Surrey Hills](#).

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Other possibilities

With the Highways (Road Humps) Regulations 1996, local highway authorities have more flexibility with regard to what is legally permitted. Sinusoidal, 'H' and 'S' shaped ramp tables ([TA leaflets 9/98: Sinusoidal, "H" and "S" Humps](#)) have been trialled whilst 50mm high road table schemes could prove useful on roads in Surrey where less speed reduction is required. With the basic limitations to [road cushion](#) effectiveness, discriminatory traffic calming remains difficult to achieve.

There are some 'humped crossing' sites in Surrey and elsewhere i.e. where the flat top of one of a series of road tables has been located to coincide with a pelican or zebra crossing. Special authorisation is not required for 'humped crossings' which could reduce the accident potential of an existing facility.

It is important that there are effective speed reduction measures on the approaches to any 'humped crossings' (that are not already one of a series of tables) in order that drivers approach speeds are appropriate.

Innovative schemes are of particular interest. It is neither practical nor desirable to use vertical deflection traffic calming as the solution to all speeding problems, and any new designs which are able to keep vehicle speeds to 30mph would be particularly welcome. Given a pedestrian / cycle friendly design and the support of bus operators and the emergency services, physical enforcement of the 30mph limit through horizontal deflection traffic calming would ensure significant progress towards the achievement of LTP2 aims.

([TA leaflets 2/97: Traffic Calming on Major Roads A49 Craven Arms, 14/99 Costessey, Norfolk](#), [TA leaflet 1/00: Traffic Calming in Villages on Major Roads](#))

The development of new traffic calming techniques is encouraged and any innovative ideas should initially be discussed with Transport Strategy. This is essential to avoid duplication, abortive work and the promotion of schemes or techniques which have clearly been proved to be ineffective elsewhere in the county or elsewhere.

This in turn is aimed at ensuring a cost effective and consistent approach countywide through the continued evolution of traffic calming good practice as a result of the continued assessment of schemes and techniques.

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DfT Local Transport Note 1/07 - Traffic Calming

[direct link to the full document](#)

The main points have been extracted below:-

General

- The information provided, including findings from research, reaffirms existing SCC policy guidelines. This is reassuring and particularly evident with guidance relating to 20mph zones / limits and consultation (Appendix B), which identifies a preliminary consultation stage, prior to more formal consultation.
- The research data presented by DfT is strangely less comprehensive than might have been expected. They cite results from a night-time noise survey in Havant being influenced by high winds....so why didn't they do the survey again ?
- A lot of DfT research puts features (such as chicanes, humps, roundabouts, gateways, cushions) together in advising as to their accident reduction potential. However, each of these features vary in design greatly and effectiveness.

Detail

Quoted research is generally consistent with Surrey guidance but the following may be of interest:-

- Vibration - 'very unlikely a risk of even minor damage to property through humps or cushions'
- Emissions – dependent on many variables (driver, vehicle, traffic conditions), traffic calming can increase emissions per vehicle but unlikely to result in poor air quality and any effect is offset by traffic diversion (average 25%). Traffic levels in residential areas relatively small bringing smaller impact than in congested urban areas
- Research suggests repeated crossing of road humps (at appropriate speed) causes no injury, though it can bring 'some minor changes' to suspension systems of some vehicles.
- 'Survey has shown that public dislike horizontal deflection more than vertical deflection' (* MORI poll of Sep 06: 53% of public in favour of road humps, with 37% against)
- Dubious to use rumble strips but certainly not as speed reduction measure. May possibly be of use in very remote locations (where noise is not a problem) as an alerting measure of hazard ahead eg bend. However, such a hazard would be signed anyway so there is an element of duplication and unnecessary clutter.
- Pinchpoints (chicanes) can be more effective if cycle bypass provided, as narrowing may then be further narrowed. Overriding principle behind SCC good practice is that it still remains very difficult to get conditions right in order for horizontal calming to work effectively all the time
- Generally chicanes can give 50% accident reduction but decrease is very variable and dependent upon location and specifics of design. (Albert Drive, Woking remains a good example with accidents reduced by more than 50%, to a level which has been maintained since the schemes introduction in 1991)
- SCC guidance recommends not to use non-physical gateways unless more effective speed reduction measures are introduced.
- Blanket changes of speed limit to 30mph in Suffolk reduced accidents by 2% (undefined time period) but of 44 sites, at only 4 was the 85% ile down to 35mph

Lack of positive guidance from solid research illustrated by dealing with cyclists; identifies roundabout hazards and goes on to mention some features 'that appeared to have a positive effect on the safety of cyclists at roundabouts' (tighter approach geometry, less entry / exit lanes, larger central island, cycle strips at give way lines, toucans on the arms).

Summary

- Existing SCC Traffic Calming policy on the web (together with explanatory Detail) should remain the prime reference on traffic calming
- No evidence from this latest publication of need to change SCC policy at all.
- However, LTN1 /07 does provide an overview of what is available in terms of standards and useful references (including full list of LTAs)

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Bibliography

A comprehensive and continually updated bibliography of national traffic calming standards and advice can be found on the [DfT website](#). In particular, a list of Traffic Advisory leaflets can be found [here](#).

Other important standards relating to traffic calming include:-

[Inclusive Mobility](#)

[Disability Discrimination Act 1995](#)

[Guidance on the use of tactile paving surfaces 1998](#)

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SURREY RESEARCH TRAFFIC CALMING SCHEMES

ACCIDENTS

Accident Rates (accidents / year)

| <i>Scheme(months data)</i> | <i>Before</i> | <i>After 1</i> | <i>After 2</i> |
|---|---------------|----------------|----------------|
| VERTICAL DEFLECTION | | | |
| MacDonald Rd, Lightwater (58) | | | |
| where humps | 1.00 | 0.00 | 0.00 |
| Crouch Oak Lane, Addlestone (50) | | | |
| where humps | 0.86 | 0.48 | 0.24 |
| Cumberland Drive, Guildford (44) | | | |
| where road humps | 1.00 | 0.27 | 0.27 |
| Feltham Hill Rd, Ashford (34) | | | |
| where tables | 2.22 | 0.35 | 0.35 |
| Park Barn Estate, Guildford (24) | | | |
| where tables | 6.60 | 3.00 | 3.00 |
| Queen Marys Drive, New Haw (43) | | | |
| where tables / humps | 0.75 | 0.00 | 0.60 |
| Lower North Street, Guildford (29) | | | |
| where tables | 1.52 | 2.90 | 1.68 |
| HORIZONTAL DEFLECTION | | | |
| Cleeve Rd, Leatherhead (46) | | | |
| where chicanes | 0.50 | 0.00 | 0.00 |
| All Cleeve Rd | 2.25 | 1.04 | 2.64 |
| Albert Drive, Sheerwater (36) | | | |
| where chicanes | 1.50 | 0.32 | 1.00 |
| raised mini | 1.00 | 0.95 | 1.00 |
| rest of Albert Drive | 6.00 | 0.95 | 4.33 |
| All Albert Drive | 8.50 | 2.21 | 6.33 |

'After 2' is the subsequent comparable time period since previous analysis ('After 1').

SPEED / SPACING RELATIONSHIPS

For a more detailed analysis of speed / spacing or other aspects of schemes in Surrey refer to Transport Strategy.

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ALBERT DRIVE - CHICANES

For possible future design purposes, similar chicane systems with spacings between **130m** and **170m** could expect to induce the following **approximate** speeds:-

| | AT CHICANE | BETWEEN CHICANES | AVERAGE |
|---------|------------|------------------|---------|
| AVERAGE | 25 | 32 | 29 |
| 85% ILE | 29 | 36 | 33 |

PARK BARN - 80mm ROAD TABLES (RAMP 1:25)

| AVERAGE SPEED | 85% ILE SPEED | SPACING |
|---------------|---------------|---------|
| 25 | 28.5 | 50 |
| 26 | 29.5 | 80 |
| 27 | 30.5 | 105 |
| 28 | 31.5 | 135 |
| 29 | 32.5 | 165 |

FELTHAM HILL ROAD - 100mm ROAD TABLES (RAMP 1:15)

| AVERAGE SPEED | 85% ILE SPEED | SPACING |
|---------------|---------------|---------|
| 19 | 23 | 25 |
| 20 | 24 | 45 |
| 21 | 25 | 70 |
| 22 | 26 | 90 |
| 23 | 27 | 110 |
| 24 | 28 | 135 |

HOLLAND ROAD, HURST GREEN -100mm ROAD TABLES (RAMP 1:15)

| AVERAGE SPEED | 85%ILE SPEED | SPACING |
|---------------|--------------|---------|
| 23.0 | 27.0 | 70 |
| 23.0 | 27.5 | 90 |
| 24.0 | 28.0 | 110* |

* spacings greater than 100m not recommended as do not encourage steady driving

COMPARISON OF FINDINGS

There is great variation in the speeds achieved at the different pilot schemes. To achieve an average overall speed of 20mph would require spacings of 45m in Feltham Hill Road.

Speeds in Holland are between 1 and 2mph faster than those recorded in Feltham Hill Road. Nevertheless, an 'average' of these two 100mm road table scheme (ramp 1:15) shown below is derived from data collected at 36 different speed / spacing locations. Bearing in mind reviewed policy which stipulates a maximum height of 75mm and on bus routes, a maximum ramp gradient of 1:20, the speed / spacing relationships below represent a reasonable guide for future scheme design:-

100mm ROAD TABLES (RAMP 1:15)

| SPACING (m) | AVERAGE SPEED | 85% ILE SPEED |
|-------------|---------------|---------------|
| 70 | 22 | 26 |
| 90 | 23 | 27 |
| 110* | 23.5 | 27.5 |

However it's important to stress that this is only a guide. National experience indicates considerable variation exists between sites where apparently similar traffic calming schemes have been introduced.

PUBLIC ATTITUDE SURVEYS

Note: Surveys related to specific schemes and do not provide direct comparisons of different measures

EFFECT OF SCHEME ON BUS PASSENGER COMFORT

CHANGE IN COMFORT

| MEASURE | LOCATION | Slightly Less | Very Uncomfortable |
|-----------------|---------------------------|---------------|--------------------|
| CHICANES | Albert Drive, Woking | 41% | 19% |
| CHICANES | Cleeve Rd, Leatherhead | 36% | 15% |
| ROUND TOP HUMPS | Cumberland Ave, Guildford | 60% | 16% |
| TABLES | Feltham Hill Rd, Ashford | 59% | 28% |

'SCHEME HAS BENEFITED ROAD SAFETY' - BY ROAD USER TYPE

| MEASURE | LOCATION | PEDAL CYCLIST | MOTOR CYCLIST | PEDESTRIAN |
|---------------------------|---------------------------|---------------|---------------|------------|
| CHICANES | Albert Drive, Woking | #31% | 22% | 46% |
| CHICANES | Cleeve Rd, Leatherhead | 8% | 8% | 17% |
| ROUND TOP HUMPS | Cumberland Ave, Guildford | 53% | 57% | 80% |
| TABLES | Feltham Hill Rd, Ashford | 64% | 51% | 81% |
| TABLES PREFERRED TO HUMPS | - | 84% | 73% | 83% |

39% "always" used cycletrack, 25% "sometimes" and 21% "never".

Main reason given for not using cycletrack was that it was not long enough.