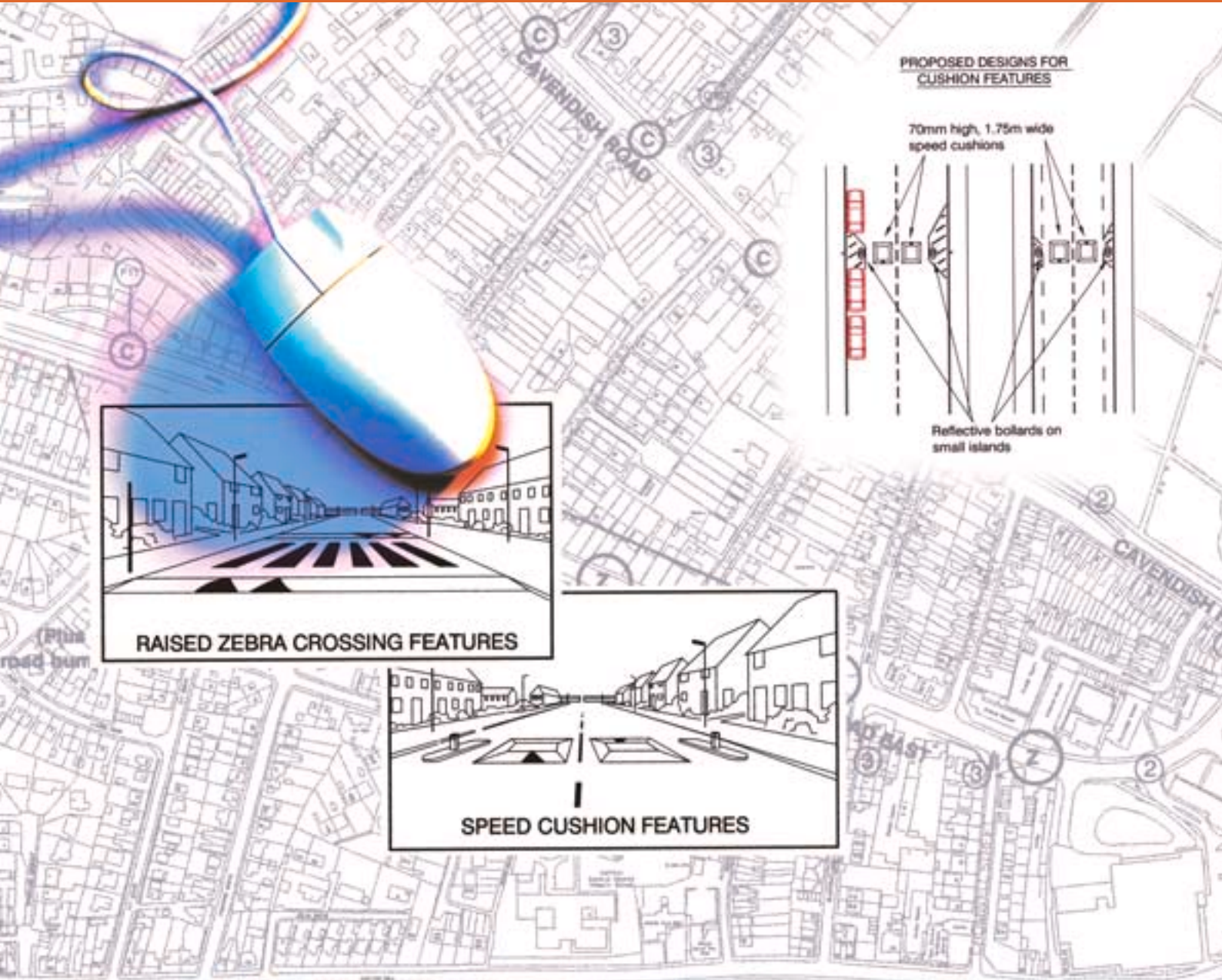




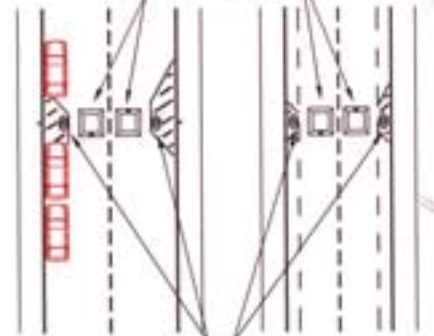
Nottinghamshire
County Council

Traffic Calming Design Guide



PROPOSED DESIGNS FOR CUSHION FEATURES

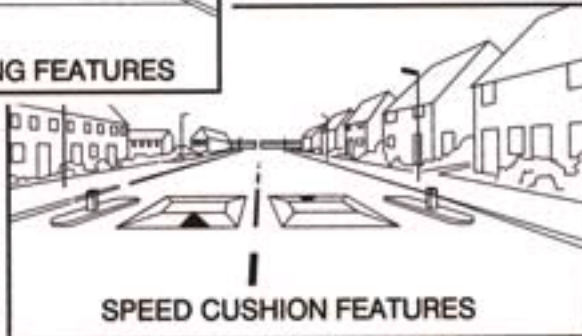
70mm high, 1.75m wide
speed cushions



Reflective bollards on
small islands



RAISED ZEBRA CROSSING FEATURES



SPEED CUSHION FEATURES



NOTTINGHAMSHIRE COUNTY COUNCIL

TRAFFIC CALMING DESIGN GUIDE

October 2004

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Director of Environment**

Introduction.

This document is intended to provide guidance to practitioners in the design of traffic calming schemes and incorporates research into best practice and the effectiveness of techniques used by local authorities throughout the UK.

The document is split into 3 sections as follows:

Section 1 – Urban traffic calming schemes

Section 2 – Village gateways and rural traffic calming

Section 3 – Safer routes to school

Objectives.

There are two main objectives to the use of traffic calming within Nottinghamshire. Firstly, the County Council has targets for road accident casualty reduction which are set by central government. These targets are reflected in the County Council Strategic Plan. Secondly, it is a stated objective to alleviate the effects of through traffic in residential areas and problems caused by inappropriate speed. Traffic calming is a proven technique to achieve both these aims through its effect in slowing traffic and encouraging traffic to use more appropriate routes.

Traffic Calming may be introduced under Section 90 of the Highways Act 1980 and the Road Traffic Regulation Act 1984. The Traffic Calming Regulations 1999 is concerned with the specification and properties of traffic calming features used in scheme design.

Benefits.

The main beneficiaries of traffic calming measures are those who live, work or shop in properties fronting busy roads and vulnerable road users such as cyclists, pedestrians and the mobility impaired.

Traffic calming techniques make use of physical alterations to the highway layout with the objective of changing driver behaviour so that vehicle speeds are reduced or by discouraging drivers from using a particular route, thereby avoiding 'rat runs'.

Speed is a major factor in many road accidents causing injury, particularly involving children. Therefore, reducing traffic speed and also reducing the amount of unnecessary traffic using a route will reduce accidents and injuries.

Hierarchy.

The road hierarchy used is identified within the current County Council Structure Plan. This may also be cross-referenced to the road hierarchy given in the Department for Transport's (DfT) Code of Practice for Highway Maintenance Management entitled 'Delivering Best Value in Highway Maintenance'.

The Structure Plan road hierarchies and corresponding DfT Code of practice hierarchies are shown in Appendix 1.

The carriageway hierarchy is available on PlanWeb. These may be accessed via the 'Network Hierarchy' option on the drop down menu.

Other considerations.

The type of features which may be used on the road network depends on the road hierarchy and whether the proposed scheme is situated on a bus route or emergency service strategic route. Emergency service strategic routes are roads which have been identified by the Fire and Rescue Service and the Ambulance Service as being main routes from stations through their operational areas. Delays along these routes may have a great effect on response times to incidents.

The Emergency Service Strategic Route is available on PlanWeb. These may be accessed via the 'Strategic emergency routes' option on the drop down menu.

The current bus routes within Nottinghamshire are published by the County Council and issued as 12 booklets covering the whole County. These are available from Public Transport Group. Scheme designers should ensure they are aware of any bus routes along the proposed scheme as this will affect the type of traffic calming features permitted.

Section 1

URBAN TRAFFIC CALMING

Policy

The following policy was approved by the Cabinet Member for Environment in April 2003 for the provision of traffic calming in Nottinghamshire.

Traffic calming will be introduced in urban areas in appropriate circumstances as a response to an actual problem on the highway network resulting in environmental concerns in communities arising from inappropriate speed or through traffic and/or as a measure to assist accident reduction and with due regard to the principles contained within the County Council's Road Safety Service Plan.

The following principles and criteria will apply to traffic calming schemes:

Accident Reduction Traffic Calming –

- i) Traffic calming will not be installed on Category 1 roads according to the County Council Structure Plan hierarchy.
- ii) Traffic calming will be permitted on Category 2, 3 or 4 roads according to the County Council Structure Plan hierarchy. However any vertical deflections or road narrowing on Category 2 or 3 roads will need the specific approval of the Cabinet Member for Environment.
- iii) A 200% rate of return on first year investment must be obtained.

Environmental Traffic Calming –

- i) Will only be considered on Category 4 roads according to the County Council Structure Plan hierarchy.
- ii) More than 250 vehicles (2-way flow) travel through the affected length during a morning or afternoon peak hour

and,

The 85th percentile speed of the daily traffic flow must exceed the stated speed limit by 20% or more.

- iii) Where at least 50% of the affected road frontage comprises residential premises.

Consultation

All traffic calming schemes will be subject to consultation at the conceptual and finalised design stage. The criteria for both stages will be:

A minimum of 35% of the delivered questionnaires must be returned, and of these, a minimum of 65% must be in favour of the proposal for the scheme to proceed to implementation.

If a scheme is promoted on accident reduction grounds and fails to achieve a 35% return of questionnaires or a 65% majority in favour, the report to EPM must specifically state this and include a request for a decision by the Cabinet Member for the scheme to proceed further.

Any departure from criteria requires the specific approval of the Cabinet Member for Environment.

Scheme Selection

Accident reduction traffic calming schemes will be identified by investigating accident statistics.

Environmental traffic calming schemes will be identified through consultation with L.S.Ps as part of the Mobility Management Action Areas processes and be actively considering deprived and conservation areas in the County.

Identification of a scheme.

Sources.

Environmental schemes will usually be identified by the Transport Strategy Group and will usually incorporate other area improvements.

Requests received by Highway Managers for consideration of traffic calming on accident grounds should be referred to the Accident Investigation Unit (AIU) for attention.

New Developments.

Where it is proposed to install traffic calming as part of a new development reference should be made to the requirements given in the current County Council Highway Design guide.

There is an increasing tendency for developers to implement traffic calming measures within a new development. This is usually to allow reduced visibility standards at junctions due to lower approach speeds and means that more properties can be included in the development. The current Highway Design Guide stipulates visibility standards for approach speeds of 30mph or higher.

Requests for traffic calming within new developments should be treated sympathetically subject to the following:

- i) Consultation carried out with the emergency services regarding primary access routes.
- ii) Agreement from the local District Council that traffic calming can be included as part of the adoption agreement so that the road is constructed to an adoptable standard.
- iii) Any traffic calming features used comply with the dimensions and requirements of the Traffic Calming Design Guide.
- iv) A commuted sum may be required. Reference should be made to the County Council commuted sums guidance note.

Private funding.

Where a request is received to privately finance traffic calming schemes reference should be made to the current County Council Guidance Note 'Privately funded highway works including traffic calming' dated January 2001.

Privately funded traffic calming can be introduced subject to the following conditions:

- i) All the criteria for the introduction of Environmental Traffic Calming must be met.

ii) The promoter must demonstrate to the Highway Authority that a thorough local consultation process in accordance with current County Council practice has been undertaken. This must show that at least 65% of the affected residents are in favour of the proposal.

iii) All costs incurred by the County Council including all staff costs are to be borne by the promoter.

iv) All details of the proposed scheme are to comply with regulations and are to be agreed by the Highway Authority. A commuted sum must also be calculated for future maintenance.

Where privately funded or new development schemes are being proposed which satisfy the initial policy and criteria, then the following issues must be considered prior to commencement of any scheme design:

i) Whether the problem is as a result of traffic temporarily transferred to the route from other local roads due to road works.

ii) Whether the road is being considered by AIU for accident reduction measures.

iii) Would other roads in the area be affected by displaced traffic or already affected by similar inappropriate traffic. If necessary, consideration should be given to extending the proposed scheme to include these roads.

iv) Whether the cause of the complaint could be remedied using other traffic management techniques.

v) Whether the problem is being caused by a particular class of vehicle and any remedial measures which could be taken to alleviate this.

Consultation.

Introduction.

A traffic calming scheme can only be successful if it is fully supported by residents. Therefore, a comprehensive consultation exercise is the only way of ensuring that the residents fully support and understand the proposal.

Initial consultation.

Once a road length has been identified as suitable for traffic calming, an initial consultation should be made with the local Highways Manager. The local County Council Member should then be made aware of the proposal. This can be achieved via PIMS or TTB.

A preliminary consultation is then carried out with affected frontagers by means of a letter drop. The initial letter should explain the principles of traffic calming and outlining the advantages and disadvantages of the proposal. It should also include a questionnaire requesting the residents' views and making it clear that the majority of the affected residents must be in favour of the proposal for the scheme to be implemented. The letter drop should include a reply paid return envelope to assist in ensuring a high response rate.

Appendix 2 provides examples of specimen letters suitable for use as a letter drop.

For schemes to be implemented on environmental grounds a minimum of 35% of the delivered questionnaires must be returned for the scheme to progress further. Of the returned questionnaires at least 65% of the affected residents must be in favour of the proposal for the scheme to progress further.

If a scheme promoted on environmental grounds fails to achieve either the 35% return rate or a 65% response in favour of implementation a further letter drop should be made informing residents that the scheme will not proceed.

If a scheme promoted on accident reduction grounds fails to achieve either a 35% return rate or a 65% response in favour of implementation, a report must be forwarded to the Cabinet Member for Environment for a decision on progression.

Follow-on consultation.

Transportation Consultative Groups

The Transportation Consultative Group (TCG) meets quarterly in each district of Nottinghamshire. These meetings are attended by Officers from each local authority, bus operators and all the emergency services.

Following the initial consultation all proposals to install traffic calming should be reported at a TCG meeting. The following points should be raised at a TCG meeting:

- Who raised the problem and what the problem is.
- A description of the area.
- A summary of site investigations, surveys and the results of public consultation.
- The justification for installing traffic calming and details of any scheme design.
- A plan outlining the proposal.
- A request for comments from the Group.

Where traffic calming takes the form of a traffic regulation order (TRO) either in isolation or in combination with other measures, then the details of this TRO also needs to be included in the presentation to TCG.

The process to be followed when introducing a TRO is detailed in the current County Council TRO manual.

If a TCG meeting is not scheduled to take place within a reasonable time period, members of the TCG should be consulted in writing detailing the information outlined above.

Formal Consultation

External Organisations

Assuming the initial consultation results are satisfactory, further consultation will then be required.

The next stage will be to ascertain whether the road is on the emergency service strategic network or on a bus route. If required, a site meeting should be arranged with representatives from the emergency services and bus operators to discuss the site layout and possible measures for inclusion in the design.

Public consultation

If public approval for a scheme is to be gained then substantial consultative steps have to be taken. The extent of this consultation will depend on the following factors:

- The size of the area to be traffic calmed.
- The nature of the features to be used.
- The effects on residents and on-street parking facilities.

Public consultation generally consists of a public exhibition which outlines the preliminary design and highlights the locations of the proposed features.

Other scheme advertisement

Scheme advertisement forms part of the consultation process. For any traffic calming works a public advertisement procedure should be followed which consists of:

- Notices placed in one or more local newspapers.
- Notices placed on site.

These notices should state the nature of the works, location, dimensions of proposed features, the length of the objection period and an address to which the public can send written objections.

The length of the objection period must be a minimum of 21 days.

The notices are to be erected at the location of each proposed feature and at the entry points to the road length to be traffic calmed.

An example of a street notice can be found as Appendix 3.

A letter explaining the background to the scheme and detailing the scheme design should be sent to the following:

- The Chief Constable
- The Chief Fire Officer
- The Chief Ambulance Officer
- The local District Council
- Bus operators using the road if applicable

It is important that affected residents and businesses are also kept informed of scheme progression and design. This is usually done at this stage by letter drop and should include details of and an invitation to the public exhibition.

A letter may also be sent to the following if deemed appropriate by the scheme designer:

- Cycling groups
- Local disabled access groups.
- Schools, community or sports centres.
- Chamber of Commerce.
- National Farmers Union (if farm plant is likely to be affected by the scheme).
- Taxi companies.

These letters should identify a timescale in which objections to the scheme design should be made. It is suggested that this is a minimum of 3 weeks and a maximum of 4 weeks.

During the consultation exercise it may be necessary for a number of reasons for a proposed feature to be moved. Should this be necessary, a further letter should be delivered to all adjacent properties affected by the move and seeking comments within 7 days.

Liaison with other County Council sections.

Landscape – The views of the landscape group should be sought at an early stage, especially if the proposal affects a conservation area.

Contact Landscape Section Team Manager – (0115) 977 2064

Abnormal loads – It should be ascertained that roads within the area of proposed traffic calming do not form part of the abnormal load route network.

Contact Bridges Section Engineers – (0115) 977 4490

Safety audits – Draft designs should be safety audited by the County Council's Accident Investigation Unit. As the scheme progresses to detailed design and construction phases, further audits will be required.

Contact Accident Investigation Unit Team Manager – (0115) 977 4487

Cycling – All designs for traffic calming must ensure that cyclists can still use the road with a minimum of inconvenience. Reference should be made to the County Council Cycling Policy document for guidance on this topic. The needs of the elderly and those with impaired mobility should also be considered.

Contact Cycling and Walking Officer (Traffic Services) – (0115) 977 4585

Maintenance and co-ordination – It should be determined whether any other maintenance works are planned on any of the roads affected by the proposed traffic calming. This may lead to efficiencies if other works could be combined or co-ordinated. The Street Works Register should also be consulted to determine whether any Statutory Undertakers are intending to carry out works in the area. This register will also provide information on any traffic sensitive road or special engineering difficulty designations.

The New Roads and Street Works Act 1991 designates the majority of traffic calming measures as 'major highway works'. There is therefore a legal requirement to comply with the Act as follows:

- i) Ensure that traffic calming scheme proposals are entered onto the County Council co-ordination list. This list is circulated to all Statutory Undertakers.
- ii) Consultation with Statutory Undertakers to ascertain the location of their apparatus and any protection or diversion of plant as they consider necessary. This is a requirement under Section 83 and 84 of the Act.
- iii) Provide a start date and expected duration of the works.

Contact NRSWA team (Network Management) – (0115) 977 4590

Objections

The resolution of objections from the public or other parties at any point in the consultation process will follow normal procedures, possibly culminating in the submission of a report to the Cabinet Member for Environment on a decision to proceed.

Scheme design and selection of features.

Introduction.

The main aim of any traffic calming scheme will be to reduce traffic speeds. Without this it will be impossible to achieve improvements in road safety or to significantly reduce the level of through traffic.

The scheme designer has a wide variety of available measures and the success of the scheme will depend upon adoption of the correct features for the particular circumstances of the scheme.

This section sets out to describe the most common techniques and features used in traffic calming. An indication is provided of the relative effectiveness of each feature to assist the designer in selecting the most appropriate technique depending on circumstances.

Types of features.

Vertical displacement techniques (VDT) – These are most commonly referred to as speed humps, plateaux, speed cushions or sleeping policemen. They all incorporate a vertical deflection to oncoming traffic, which if approached too quickly, will result in extreme driver and passenger discomfort. These techniques may be used in isolation or in conjunction with other features. VDTs usually lead to substantial reductions in traffic speed. (VDT will not be permitted on Cat 1 Roads and special Cabinet Member approval is required if Cat2 & 3 roads.)

Horizontal displacement techniques (HDT) – These rely on slowing traffic down by means of horizontal deflections and typical applications include chicanes, road narrowing and mini roundabouts. These techniques are usually used in conjunction with a VDT. If used in isolation, only modest speed reductions will be achieved. As this technique usually causes vehicles to cross into the lane of oncoming traffic a certain degree of conflict is inevitable and is in fact the main way that traffic is made to reduce speed on the approach to the HDT. However, care must be taken when introducing these techniques to ensure that such conflicts do not lead to an increase in accidents. (HDT will not be permitted on Cat 1 roads.)

Supporting techniques (ST) – These are essentially cosmetic changes to the road surface aimed to influence driver behaviour. Examples of this technique include gateways, coloured surfacing, planting or changes to street lighting. ST may also be used to highlight changes to speed limits or approaches to hazards. If used in isolation these techniques are unlikely to yield any noticeable reduction in traffic speed. Therefore, these techniques are usually used as complementary measures to VDT and HDT.

Traffic regulation orders (TRO) – These usually consist of imposing weight restrictions on roads, introducing or reducing speed limits, prohibiting turning movements or in extreme cases road closures. With the exception of speed

limit reductions, the main aim of a TRO is to directly influence the volume or type of traffic able to use a road. These can be very effective measures in reducing traffic, however problems occur due to inconvenience caused to residents who also have to comply with the order. This could attract high levels of dissatisfaction and a resulting non-compliance of the order, which if not enforced adequately will lead to erosion of the initial benefits. When introducing a TRO, the designer must also be aware of the effect of transferring vehicles onto other routes.

Design objectives.

It should be stressed that a safer environment is best achieved by utilising a combination of the above techniques. The designer should therefore seek to:

i) Reduce traffic speed by means of physical measures

and

ii) Attempt to influence driver behaviour by creating an environment which is more conducive to safety and an awareness of pedestrian, cyclists and other road users.

Selection and use of traffic calming techniques.

Specifications and detail drawings for current approved traffic calming features are contained in the County Council Standard Detail Drawing document.

It is important that the scheme designer recognises that the introduction of traffic calming features will cause adverse effects to some road users and must therefore seek to minimise those effects likely to cause most concern.

The most likely adverse effects include:

i) Delays to emergency service vehicles.

ii) Increased risk of injury to Fire and Rescue personnel who may be fitting clothing and equipment en-route.

iii) Increased risk of injury to Ambulance crews treating casualties en-route to hospital.

iv) Increased suffering to ambulance patients especially in the case of those with spinal injuries.

v) Poor quality of ride and delay to bus passengers.

vi) Additional 'wear and tear' caused by negotiating VDT to emergency service vehicles and buses.

vii) Possibility of grounding for vehicles with a long wheelbase and/or for scraping of bodywork or the underside of some cars.

viii) Increased vehicle noise and exhaust emissions caused by vehicles negotiating features and from gear changes and speed reduction.

When considering scheme design, the designer will often be constrained by the presence of various physical obstructions, accesses, junctions, road widths, drainage and cost implications.

All drawings and specifications for traffic calming features are contained in the County Council Standard Detail Drawings document.

Vertical Displacement Techniques (VDT) – Specific Features.

Road Humps General – May be Round-Top or Flat-Top and are always laid perpendicular to the traffic flow. Both may extend from kerb to kerb or built short of the channel to allow normal drainage. Where the road hump incorporates side slopes the minimum slope gradient should be specified as this assists cyclists and motor cyclists to negotiate the feature with the minimum risk.

Road humps must conform to the current County Council specification as detailed in current Standard Detail Drawings document.

Round-Top Road Humps – Are very effective in reducing vehicle speeds and are normally the most cost effective and easily constructed of the VDT options.

Hump dimensions are usually 3.7 metre or 5.0 metre long by 70mm high.

5 metre humps to this profile have been found to achieve the lowest values of discomfort to most users including bus passengers and occupants of ambulances and fire appliances. Because of this, the average crossing speeds tend to be higher (around 20mph – 25mph) than at 3.7 metre round-top humps (around 15mph). Therefore, 5 metre round-top humps may be more appropriate in locations where it is hoped to achieve maximum speeds of around 30 mph, whereas 3.7 metre round-top humps are more suitable for use where it is hoped to achieve a 20 mph maximum.



Fig 1 Round Top Road Hump

Sinusoidal Road Humps – This profile offers slightly less discomfort to cyclists than round-top road humps, but very little advantage to bus passengers, car users or emergency service vehicle occupants.

Hump length is usually 3.7 metre long by 70mm high and speed reductions are similar to those achieved by 3.7 metre round-top humps.

Sinusoidal profiles are difficult to construct unless using pre-formed blocks.

At typical crossing speeds, noise and ground-borne vibration levels have been found to be lower for this profile hump than round-top humps.

Flat Top Road Humps (Straight ramps) – Are as effective as round top road humps as a means of speed reduction. However, vehicle grounding problems are more prevalent due to the sharper ramp effect and they are also more difficult to construct.

The speed retarding characteristics of these features is derived solely from the entry and exit ramps and therefore these features have the advantage of the ability to be constructed to various lengths.

Normal construction height is to be 75mm.

At entry speeds above 20 mph the discomfort experienced by car occupants increases compared to round-top humps. This type of feature is permitted on strategic emergency routes and bus routes subject to a minimum flat plateau length of 8 metre (i.e. 10.2 metre overall hump length). This type of extended ramp is often referred to as a 'speed table'.

Where block paving is proposed as an environmental component to a scheme this will be most easily accommodated within the profile of a flat top hump which may also be made flush with the adjoining footway to assist with pedestrian crossing movements. Care is needed to avoid excessive ramp gradients in this instance.



Fig 2 Flat top road hump incorporating block paving.

Noise and ground-borne vibration is higher for this profile than round-top humps.

Flat Top Road Humps (Sinusoidal ramps) – Very little benefit in terms of vehicle occupant discomfort and hence speed reduction is achieved in the use of this profile hump when compared to straight ramps. However, noise and ground-borne vibration is lower than for flat-top humps with a straight ramp

and they also provide a smoother transition for cyclists and powered two-wheelers.

Speed Cushions – These were introduced to overcome concerns about passenger discomfort and delay expressed by bus operators and the emergency services which resulted from the use of road humps.

The width of speed cushion used is gauged to allow wide wheelbase vehicles such as buses or fire appliances to straddle the feature, thereby not impeding their progression through the site. Powered two-wheelers and cyclists are also able to use gaps between the cushions so as to be unaffected by these features. This can lead to problems where excessive motorcycle speeds are an issue.

Normal layouts are as follows:

- * Single cushion – used in conjunction with road narrowing to allow one-way traffic flow. Suitable for low traffic flow roads only.
- * Paired cushions – allows two-way traffic flow and therefore suitable for use on high traffic flow roads.
- * Triple cushions – used on wider carriageways negating the need for any road narrowing technique.

Previous practice in Nottinghamshire was to use cushion widths of 1.9 metre. However, due to the severe effect this cushion width has on vehicles the usual width is now 1.75 metre. Lengths are normally 1.9 metre. Normal construction height is to be 70mm.

Approach ramp gradients should be no greater than 1:8 and side slope gradients should be a maximum of 1:4.

Use may also be made of 'modified' cushions where appropriate. These resemble standard cushions, but are rounded in profile to cause less impact to vehicular traffic. Average ramp gradients on these cushions should not exceed 1:5. Normal construction height is 65mm. This type of cushion is less effective at speed reduction than traditional speed cushions.

Tests have shown that fire appliances and other emergency service vehicles are able to cross speed cushions 10-20 mph faster than road humps without excessive discomfort. Therefore, to assist in response times and reduce discomfort to emergency service vehicle occupants, the use of 1.6 metre wide cushions should be considered where installed on environmental schemes on strategic emergency routes and also on main bus routes.

In all cases, it is important that cushions are installed so that vehicles can straddle them easily. This may require consideration of parking management in the vicinity of the cushions.

The table below details vehicle crossing speeds at cushions of various widths during TRL Research.

Vehicle speed (mph)	Speed cushion widths (metres)					
	1.5	1.6	1.7	1.8	1.9	2.0
Average	20.5	19.9	17.0	16.1	15.1	14.0
85%ile	28.0	26.0	24.5	22.5	20.0	18.1

To gain maximum benefits, speed cushions need to have the appearance of being more severe than they are. The use of cushions with a contrasting colour to their surroundings together with a white thermoplastic screed surround helps to achieve this.



Fig 3 Speed cushions

Spacing of vertical deflections.

The spacing between features is the main cause of effective speed reduction of any traffic calming scheme. Too wide a spacing and traffic will speed up between features, too close and severe vehicle occupant discomfort will be felt leading to complaints and possible later removal of features to alleviate these.

Therefore, the spacing used should encourage a smooth driving style. This will also assist in noise reduction as acceleration and braking will be reduced between features.

In order to gain maximum speed reduction on schemes installed on accident reduction grounds, features should be installed at a spacing no closer than 80 metres and no greater than 100 metres.

Where features are installed as part of an environmental traffic calming scheme spacing should be no closer than 100 metres and no greater than 150 metres.

The table below details vehicle speeds between vertical deflections at various distances during TRL Research.

Vehicle speed (mph)	Distance between features (metres)					
	50	60	70	80	90	100
Average	19.5	20.2	21.5	22.5	24.0	24.9
85%ile	22.5	24.0	25.2	27.0	28.0	30.0

Signing

There is no requirement to sign individual vertical deflections.

Signing to diagram 557.1 of the Traffic Signs Regulations and General Directions 2002 should be erected at the start of the traffic calmed area, together with supplementary plates to diagram 557.2, 557.3 or 557.4 as appropriate.

Ramped pedestrian crossings should be signed to Diagram 543 or 544 together with the appropriate supplementary plate to diagram 547.8.

Horizontal Displacement Techniques (HDT) – Specific Measures

Two design objectives should be considered initially when designing a traffic calming scheme incorporating HDT. These are to achieve either one-way or two-way traffic flow. One-way traffic flow achieves the greatest reductions in traffic speeds, but is not always suitable in areas of high traffic flow.

Research has shown that in some instances, the introduction of HDT has led to an increase in the number and severity of road accidents due to the imposition of traffic being forced into the oncoming traffic flow.

In any design, consideration should be given to allowing adequate highway drainage and street cleansing functions whenever HDTs are installed.

Reflective bollards to warn of the obstruction to approaching vehicles must be included as part of any HDT.

Chicanes – are used as a means of providing horizontal deflection of traffic on an otherwise straight length of carriageway or to reallocate a part of the carriageway to other users. Speed reduction is achieved by causing drivers to make a series of turns, by reducing forward visibility or causing drivers to give way to oncoming vehicles. Varying degrees of deflection may be introduced depending on the volume of traffic, traffic speeds and geometric limitations of the site.

Chicanes may be derived from defined on-street parking arrangements or from footway build-outs.

Half chicanes – comprise build-outs on one side of the road and may be extended into the carriageway such that only one-way traffic is possible.

Total traffic flow needs to be in the region of 4000-8000 vehicles per day. Less traffic flow would seldom require approaching traffic to stop and give way whilst a higher traffic flow would lead to unacceptable congestion.

Priority signing and lining should be installed such that the deflected traffic must give way to oncoming non-deflected traffic. Half chicanes should be installed such that traffic entering the traffic calmed area from a higher speed area is deflected and slowed down accordingly.

Build-outs may be reduced in size to allow two-way traffic flow where traffic flows exceed 8000 vehicles per day. In this instance they are particularly useful in providing end protection to on-street parking bays.

Full chicanes – comprise build-outs on both sides of the carriageway, staggered so that the first one approached is located on the nearside. These may be arranged such that larger deflection and therefore greater speed reduction is achieved.

Full chicanes should only be installed to cause one-way traffic flow as the width required for two-way flow will encourage vehicles to adopt a straight line through the site causing conflicts with oncoming vehicles.

Normally one-way traffic flow will require a carriageway width of 3.0-3.6 metres with two-way traffic requiring 4.5-6.5 metres. However, care must be taken to match carriageway widths to traffic flow and vehicle types.



Fig 4 Pinch point

Design

The following dimensions should be calculated to assist in scheme design:

- * free view width (A) – the observed width of the gap between features as viewed on the approach.
- * lane width (B) – the width between the build out and the opposite kerb.
- * stagger length (L) – the length between the start of the stagger on the offside and the finish of the stagger on the nearside (or vice versa).
- * path angle – the angle through which the traffic lane is displaced.

Path angles

Research has shown that the greater the path angle, the greater the reduction in traffic speed.

Generally path angles greater than 15 degrees will reduce the average traffic speed to less than 20 mph, whilst path angles of less than 10 degrees will allow through traffic speeds in excess of 25 mph. In practice a path angle of 15 to 20 degrees should be aimed for as this has been found to give 85th percentile speeds of 20 to 25 mph through the features.



Fig 5 Full chicane

To achieve an effective design the following should also be considered:

- * a speed reducing feature such as a roundabout, junction or the introduction of give way markings should be used prior to the first HDT.
- * the distance between any speed reducing feature and the first HDT should be between 40 to 80 metres to be effective. The more severe the path angle or higher the approach speed the closer the HDT needs to be to the speed reducing feature.
- * HDT need to be adequately illuminated and incorporate reflective bollards.
- * at chicanes causing one-way traffic flow, opposing drivers must have sufficient forward visibility to enable them to give way without sudden braking.
- * the use of overrun areas are effective at giving drivers the impression of restricted carriageway widths therefore encouraging lower speeds whilst allowing sufficient room for larger vehicles.
- * wherever possible, cycle bypasses should be included in the chicane. This should be delineated to deter use by powered two-wheelers.
- * the appearance of the chicane can be made more aesthetic by the use of low growth planting. Care must be taken to avoid obstructing traffic sight lines. The Highway Design Guide provides details of suitable plants for use in these circumstances.
- * chicanes generate less noise than vertical deflections, but may encourage more braking or acceleration where one-way traffic flow is imposed on high traffic flow roads.

Design dimensions for chicanes obtained from TRL research is described in the table below.

Stagger lengths and car speeds

Lane width (B) (metres)	Free view width (A) (metres)	Stagger Length (L) to achieve the required vehicle speed in chicane		
		15 mph	20 mph	25 mph
3.0	+ 1.0	6 metres	9 metres	14 metres
	0.0	9 metres	13 metres	18 metres
	- 1.0	12 metres	16 metres	-
3.5	+ 1.0	-	-	11 metres
	0.0	9 metres	12 metres	15 metres
	-1.0	11 metres	15 metres	19 metres
4.0	+1.0	-	7 metres	9 metres
	0.0	-	9 metres	12 metres
	-1.0	-	11 metres	15 metres

Stagger lengths for large vehicles

Lane width (B) (metres)	Stagger length (L) needed for free view width (A) of 0.0 metres		
	Articulated lorry	Rigid lorry	Single deck bus
3.0	20 metres	12 metres	13 metres
3.5	15 metres	9 metres	11 metres
4.0	11 metres	7 metres	9 metres

Road narrowing – is used to decrease the road width over an extended length. This requires substantial rekerbing and footway works to accommodate. Typically, the carriageway width is reduced to 5.5 metres, the minimum for two-way traffic flow.

The advantage of road narrowing is the ability to provide a more pedestrian friendly environment by reallocating space and allowing easier road crossing. They also discourage overtaking or inappropriate parking.

Pinch points – comprise coincident build outs on each side of the carriageway, thereby decreasing the available width over a short length of road. This technique is a useful aid in assisting pedestrian crossing movements and may also influence driver behaviour by conveying a feeling of pedestrian dominance.

Mini roundabouts – provide a degree of speed reduction and conflict reduction. The centre island should be sufficiently large in diameter to introduce significant vehicle deflection, however excessive deflections will cause difficulties for large vehicles. These features are not particularly suitable in areas with high pedestrian or cycle flows.

Signing of horizontal deflections

The Traffic Calming Regulations 1999 state that where any build-out, chicane, pinch-point or any combination of such works is constructed or maintained in a highway, the Highway Authority shall place and maintain traffic signs in such positions as the Authority dictates for the purpose of providing adequate warning of the presence of such traffic calming features, unless the traffic calming are so constructed as themselves to provide adequate warning to persons using that highway.

However, no traffic signs are required to warn of the presence of traffic calming features within a 20-mph zone (see Section 4).

The Traffic Signs Regulations and General Directions 2002 allow Give Way markings to Diagram 1003 to be used either on their own, or in conjunction with priority signing to Diagram 615. This sign must be accompanied by the supplementary plate to Diagram 615.1 and the sign to Diagram 811 with supplementary plate Diagram 811.1 must also be erected to face traffic in the opposite direction.

DfT advice is that give way markings to Diagram 1003 alone should be sufficient for most schemes. The additional signing will generally only be needed where extra emphasis is needed.

The use of give way markings on both approaches to pinch-points is not considered good practice.

Supporting Techniques (ST) – Specific Features.

Priority management – should normally be used in conjunction with complimentary changes to the carriageway layout, for example following the installation of chicanes.

Normally, give-way markings are introduced at the approach to any build-out ensuring that oncoming traffic receives priority and that one-way traffic flow is achieved. Priority management is also an integral part of mini roundabout provision.

Roads may also be broken down into shorter lengths by switching priority to traffic entering and leaving side roads. In this instance, build-outs are usually incorporated into the main road to limit forward visibility and provide deflection.

3 or 4 leg give way junctions should not be introduced.

Centre islands – are used to reduce effective carriageway width, thereby discouraging overtaking, inappropriate parking and facilitating easier pedestrian crossing movements. However, where the intention is to create a formal crossing point the centre island must be of sufficient width to minimise overcrowding and should include dropped kerbs and tactile paving. Where overcrowding is a possibility, for example in the vicinity of schools, they should not be provided unless large enough to accommodate pedestrian barriers.

The use of centre islands in conjunction with School Crossing Patrols is discouraged due to the difficulties encountered by Patrols in controlling children when making two crossing movements.

Centre islands may also be used as part of a village gateway treatment. Section 2 provides further details on use in this instance.

Small corner radii – are used to ensure that vehicle turning movements are undertaken at a speed commensurate with the area, thereby reducing pedestrian, vehicle and cyclist conflict. Pedestrian crossing movements are made easier due to the reduced carriageway width.

The actual size of radius used should reflect the carriageway function and anticipated vehicle type. These are typically from up to 8.0 metres (Category 2 or 3 roads) down to 2.0 metres on Category 4 roads.

Junction treatments – may be considered at 3 or 4 leg junctions and may be a combination of horizontal or vertical deflection techniques. Elements may include the following:

- small corner radii
- road humps at entry points
- raised plateau over the turning area
- footway build outs

- improved lighting

Entrance treatments – are often used to define the start and finish points of a traffic calmed area. They are intended to warn drivers to expect changes in road layout or conditions.

Warning signs to Diagram 557.1 of the Traffic Signs Regulations and General Directions 2002 should be erected, together with appropriate supplementary plates. These may be erected in conjunction with a grey coloured backing board with the approval of the local Highways Manager.

Overrun areas – these create the illusion that the running lane is narrower than it actually is and are usually considered in connection with chicanes and other measures such as small corner radii which bring about horizontal shift and are necessarily designed to tighten the turning movements of vehicles.

Significant reductions in speed will only be achieved if the vehicle displacement is adequate. In some instances this will prevent buses or lorries being able to negotiate the corner. In these circumstances it may be possible to insert additional strips at the carriageway edge or centre so that occasional trafficking of the area is possible.

Overrun areas may be constructed from a variety of materials. The only requirements being that they form a contrast with the surrounding carriageway and do not result in any risk or damage to road users. This is often achieved by the use of granite setts which may be overrun by large vehicles, but will discourage overrun by smaller vehicles.

Alternatively, overrun areas may be used in longer, straighter lengths to narrow the carriageway, provide cycle facilities or increase pedestrian/vehicle separation. This may be achieved by use of white lining or kerbing.

Any vertical face formed as part of an overrun area should not exceed 6 mm.

The design should be maintenance free with consideration to ensuring that water does not pond on or against the overrun area.

Signing is not necessary, however it is advised that these features are not used on unlit roads unless lighting is installed especially to illuminate the overrun area.

Road markings – are used in a variety of ways to define vehicle paths, reinforce speed limits, introduce cycle facilities or highlight hazards.

However, lining is undesirable in certain circumstances such as:

- conservation areas or other environmentally sensitive areas
- unsuitable road surfaces
- where use may confer excessive vehicular priority

Surface changes – may take the form of texture changes or red coloured surfacing in appropriate circumstances.

They may be used to emphasise pedestrian activity or to warn of a road hazard. In pedestrianised areas changes in colour or texture may be achieved by the use of block paving or setts. The current County Council Highway Network Management Plan provides guidance and policy on the use of coloured surfacing.

Rumble devices – comprise a series of raised bands laid transversely across the carriageway and are normally formed from thermoplastic paint.

They are normally used in advance of a specific hazard or at the entry point to a traffic calming scheme. Drivers are alerted to the change in road layout or conditions ahead by the noise and vibration of the device when driven over. A disadvantage of this is the amount of noise generated. Therefore, these devices should not be used in built-up areas.

Speed cameras – The County Council Highway Network Management Plan provides details on the use of speed cameras within Nottinghamshire.

Vehicle-activated interactive road signs – The County Council Highway Network Management Plan provides details on the use of these signs within Nottinghamshire.

Lighting, planting and street furniture – the installation of these features is unlikely to yield any speed reduction or alteration to driver behaviour. However, their inclusion will often provide environmental, amenity or other benefits which make the traffic calming scheme more acceptable to residents.

Planting may be used to limit forward visibility and street furniture may be positioned to exclude vehicles from certain stretches. Lighting can be used to good effect to highlight road layout.

Traffic Regulation Orders (TRO).

There is normally a high degree of signing and lining associated with the implementation of TROs and in many cases this will be both visually intrusive and cause a distraction to motorists.

However, TROs may represent an effective and cost effective alternative to the installation of traffic calming features. The implementation of TROs should follow the procedure outlined in the County Council TRO Manual.

TROs may be considered in the following circumstances:

- to stagger parking to simulate a chicane arrangement
- to prohibit turning movements which may significantly alter traffic flows
- implement road closures
- implement changes to speed limits

General Design features

- Do not use transverse kerbs in the carriageway. These will crack and spall or become loose from trafficking by vehicles. It is also difficult to install these and maintain a maximum 6mm vertical upstand.
- Check the construction tolerances and consider the implications on finished heights and gradients with regard to existing road profile.
- Do not position features such that they hinder turning movements or access/egress from driveways or commercial entrances.
- Consider pedestrian movements early in the design stage. Safer and more convenient crossing points could be included as part of a scheme or the use of bollards/street furniture may inhibit traffic movements.
- Do not use pipes or narrow channels at the base of build outs as a drainage feature. These will fill with detritus and fail. A wider channel can be utilised as a cycle bypass. Otherwise a road gully should be installed and connected to a positive drainage system.
- Features should be located with regard given to bus stops, driveways, existing parking or prohibitions in parking, kerb heights, bends and gradients, street furniture, junctions, road widths, existing centre refuges and lay-bys and buildings such as emergency service stations or schools.

Section 2
VILLAGE GATEWAYS

Introduction

This section is intended to outline the features to be used in the design of village gateways. In this way a common theme will be maintained throughout the County's gateways. It is intended that gateways are only to be applied on roads subject to a 30mph speed limit.

General guidance

Each gateway should be designed with regard to the specific requirements of the site.

The following features will form the design of each scheme:

- i) Two village nameplates incorporating a speed limit roundel should be erected at each gateway.
- ii) The reverse of the gateway sign is to incorporate appropriate exit speed limit roundel.

The speed limit roundel will be to diagram 670 of the Traffic Signs Regulations and General Directions 2002.

Signs displaying the safety message "Please drive carefully", "Please drive slowly" or "Thank you for driving carefully" may be incorporated into the village nameplate or as a supplementary plate. These may be erected on the gateway signs and/or on the exit signs.

Signs displaying the name of a twinned town or village will be permitted. These must only form part of the village nameplate and the additional costs will be borne by the Parish Council.

Drawings showing suggested approach profiles for a gateway layout are contained in the County Councils Standard Detail Drawings document.

Parish Councils should be encouraged to create low level planted areas around the base of each gateway. Maintenance of these planted areas will remain with the Parish Council. In these instances it will not be necessary for the Parish Council to obtain a Section 142 'Cultivation licence'. Appendix 1 of the current Highway Design Guide provides details of suitable plants.

Where possible, five marker posts are to be erected on the approach to the gateway signs. These are to be angled in to create the impression of the road narrowing and spaced at 5 metre intervals.

The gateway should be designed to obtain a 3.25 metre running lane in both directions through the gateway. This may be increased as required if the route is classed as an abnormal load route. Consideration should be given to the use of centre line hatching and/or refuges at the gateway where the running lane width exceeds 3.25 metre. Where these are proposed, consideration

should be given to the future maintenance of the refuges, particularly with regard to bulb changing and sign cleaning.

White thermoplastic (not adhesive type) speed roundels are to be laid on the carriageway. These are to be 7500mm long on all A and B class roads and 4300mm long on all other road classes.

The thermoplastic speed roundels are to comply with diagram 1065 of the Traffic Signs Regulations and General Directions 2002.

White thermoplastic side-bar lining is to be laid adjacent to road channels. These are to be 150mm wide on all A and B class roads and 100mm wide on all other class roads.

The County Council Standard Detail Drawings document contains a suggested plan view of a gateway layout.

The Local Transport Plan Team should be advised of all gateways for them to decide whether before and after traffic flow counts and speed surveys are required.

Special consideration should be given to the siting of gateway signs where equestrians regularly use the adjacent verge.

Design guidance

Sign posts

Illuminated sign post types are detailed in the County Council Standard Detail Drawings document. These are to be blue in colour and conform to BS4800 colour ref 20C40.

Non-illuminated signs post types are detailed in the County Council Standard Detail Drawings document. These are to be constructed from steel, 76mm diameter and black in colour.

Use of coloured surfacing

The provision of coloured surfacing must comply with the current County Council policy as summarised below.

At village gateways, the use of red surfacing is permitted, but is not mandatory. Where used, it should be laid for half the carriageway width and incorporate the white thermoplastic speed roundel. The length of red surfacing should be the same as the white thermoplastic edge line.

The red surfacing may be high friction surfacing where the gateway coincides with the approach to a road hazard.

A plan detailing the location of the red surfacing area should be forwarded to the Network Management Section on completion of the works to enable the information to be entered on the National Street Gazetteer and highway inventory.

Clearance dimensions

The following clearances must be maintained to ensure the safety of highway users.

The distance from any property line to the outer edge of pole/sign is to be a minimum of 275mm.

The distance from the carriageway channel to the edge of the pole/sign is to be a minimum of 450mm and a maximum of 600mm, unless there is an adjacent footway.

Illumination requirements

All white thermoplastic road markings should comply with the current reflectivity requirements as specified in the current British Standards.

The Traffic Signs Regulations and General Directions 2002 (Schedule 17, items 10 and 11) state that the speed limit sign (diagram 670) shall be illuminated as follows:

i) Where the sign is erected on a principal road within 50 metres of a street light, it shall:

a) During the hours of darkness, be continuously illuminated by means of external or internal lighting and may also be reflectorised.

Or,

b) During the period that the street light is lit, be continuously illuminated by means of external lighting and shall also be reflectorised.

ii) If the sign is not required to be illuminated by lighting, it may be illuminated by internal or external lighting, but if not so illuminated it shall be reflectorised.

The Traffic Signs Regulations and General Directions 2002 (Schedule 17, items 9) state that the village name plate (diagram 2402.1) shall be illuminated as follows:

i) The plate may be left unlit or be illuminated by internal or external lighting, or by the use of retro-reflecting material.

The current County Council Highway Network Management Plan outlines the standards for retro-reflective material required for differing road categories.

The reference to Road Category is that stated in the current County Council Structure Plan.

Section 3

SAFER ROUTES TO SCHOOLS

Introduction

This section is intended to outline the features to be used in the design of a Safer Routes to School (SRTS) scheme so that drivers approaching a school zone will pass through a familiar pattern of features. This will encourage drivers to alter their behaviour in reducing speed and raise awareness that children will be encountered on the stretch of road in question and therefore that additional caution is required.

Definitions

Safer Routes to School

Overall measures which aim to improve conditions (both in terms of safety and the environment) on main walking and cycling routes to school. It may include physical measures such as crossing points and improvements to signing and lining.

School Zone

The area immediately adjacent to the school entrance containing specific features to raise awareness of the presence of the school and assisting in reducing traffic speeds in the interests of safety. It may include traffic management measures to control traffic or to actually reduce the number of vehicles accessing the length of road.

School Travel Plan

These are prepared by the local school and may include safety awareness raising and education to reduce the number of car based trips to school whilst ensuring safety concerns are addressed. The Plan may also identify measures needed under a Safer Routes to School or School Zone scheme and also measures intended to support walking and cycling facilities within the school grounds.

General guidance

Safer Routes to School and School Zone schemes should aim to:

- Benefit the maximum number of schools and pupils
- Address known accident problems to assist in the achievement of Government targets to reduce the number of child KSI accidents.
- Improve safety at school crossing patrol sites.
- Identify and address pedestrian and cycling priorities in line with published policies.
- Offer increased amenity to the local community wherever possible.
- Complement other highway, pedestrian or cycling schemes.

The Road Safety section will identify the school areas which would benefit from a SRTS or SZ scheme.

Road Safety (Senior Officers) will identify the scheme limits based on local knowledge and in liaison with Highways Division, who will design the scheme based on guidance contained within this design guide.

The Transportation Division (Services and Safety Group), in promoting School Travel Plans to schools will liaise with other Divisions and agencies as appropriate to ensure best value in service provision.

Concept and outline design will be discussed between Transportation, Highways and the Road Safety section. Highways division will undertake the detailed design, which they will provide to Road Safety for approval.

A set of measures has been identified which will contribute to meeting the LTP objectives and support SRTS and SZ schemes. These are set out under 3 categories:

- Pedestrian facilities.
- Road markings and signing.
 - Other measures.

These measures are expanded in the Design Guidance section.

Design Guidance

Pedestrian facilities

The use of controlled pedestrian crossings will not be proposed on all schemes and will follow the criteria listed below.

The provision of dropped pedestrian crossings will follow the guidance contained in the current Highways Network Management Plan.

The use of vertical deflections as part of SRTS or SZ schemes will follow the urban traffic calming guidance contained in Section 1.

The installation of pedestrian crossing facilities should comply with the criteria detailed below.

Surveys to calculate the pv^2 value should measure all pedestrian movements (p) and total vehicular flow (both directions) (v). Unless otherwise detailed in the criteria for specific features, the survey should be carried out over a nine hour period between the hours of 0700 to 1000, 1100 to 1400 and 1500 to 1800 on 100m lengths of road. The pv^2 value (pedestrian movements multiplied by the vehicular flow squared) is calculated for each hour. The four highest values are then averaged to give the final figure to be used in the evaluation against the criteria detailed below.

The reference to meeting a potential pv^2 value is intended to cover circumstances where site conditions may reasonably be expected to reach

such a value in the foreseeable future due to nearby residential or industrial development taking place.

Note that the pv^2 value used is $\times 10^8$.

Central Refuges

A central refuge will normally only be considered as part of a SRTS or SZ scheme where the pedestrian/vehicular flow reaches, or would potentially meet, a pv^2 value of 0.25 during school peak travel times. In addition to this there should normally be a need for residual use throughout the remaining 9 hours of the pv count.

A central refuge may also be considered as part of a SRTS or SZ scheme where the Road Safety section have identified a history of injury accidents involving pedestrians aged 0-18 years at the location and it is considered that a central refuge is the most effective remedy to the problem.

The provision of a central refuge will be subject to site constraints and consultation.

Where it is intended that a central refuge will be used as a crossing facility rather than to discourage vehicle overtaking, the minimum width should be 1.5 metres. A minimum carriageway width of 3.0 metre should be maintained past the central refuge. The refuge should also incorporate tactile paving.

The use of central refuges is not recommended where a school crossing patrol operates due to the difficulties experienced in controlling 2 crossing movements.

Mini-roundabout

A mini-roundabout will rarely form part of a SRTS or SZ scheme, given that it assists traffic capacity rather than pedestrian or cyclists. However, a mini-roundabout may be considered when junction capacity problems arise due to school start/finish times which are contributing to poor road safety conditions. Accident records will assist in this determination.

The following conditions should be met for the installation of a mini-roundabout as part of a SRTS or SZ scheme:

- A minimum of 100 pupils crossing at the proposed location during school start/finish times.
- A minimum of 500 vehicles pass through the location during school peak travel times.
- Insufficient gaps form in the traffic flow to allow vehicles to turn out of the junction or pedestrians to cross at the junction.
- There is a recognised history of accidents involving child pedestrians or cyclists making turning manoeuvres at the junction.
- It is considered that a mini-roundabout is the most effective remedy to the problem.

The provision of a mini-roundabout will be subject to site constraints and consultation.

Crossing points adjacent to mini-roundabouts should include tactile paving.

Zebra crossing

A zebra crossing will normally only be considered as part of a SRTS or SZ scheme where the pedestrian/vehicular flow reaches, or has the potential to reach, a pv^2 value of 0.50 during school peak travel times. In addition to this there should normally be a need for residual use throughout the remaining 9 hours of the pv count. Also, the minimum number of pupils crossing within 100 metres of the proposed location should be at least 100 crossing movements per day.

A zebra crossing may also be considered as part of a SRTS or SZ scheme where the Road Safety section have identified a history of injury accidents involving pedestrians aged 0-18 years at the location and it is considered that a central refuge is the most effective remedy to the problem.

The provision of a central refuge will be subject to site constraints and consultation.

Light signal controlled crossing

A light signal controlled crossing will normally only be considered as part of a SRTS or SZ scheme where the pedestrian/vehicular flow reaches, or has the potential to reach, a pv^2 value of between 1.0 and 2.0 during school peak travel times. In addition to this there should normally be a need for residual use throughout the remaining 9 hours of the pv count. Also, the minimum number of pupils crossing within 100 metres of the proposed location should be at least 300 crossing movements per day.

A light signal controlled crossing may also be considered as part of a SRTS or SZ scheme where the Road Safety section have identified a history of injury accidents involving pedestrians aged 0-18 years at the location and it is considered that a central refuge is the most effective remedy to the problem.

A Pelican or Puffin crossing should be considered where constant usage exists (e.g. where a road intersects a school campus). A Toucan crossing should be installed where a SRTS or SZ scheme links with a cycle route.

Light signal controlled junctions should incorporate a pedestrian phase where they are within a SRTS or SZ scheme.

Footway build-outs

May be included in a SRTS or SZ scheme to formalise on-street parking arrangements. They are also particularly useful at school crossing patrol sites.

Marker posts/bollards should be used on the build-out to highlight their presence and careful choice needs to be made to guard against vandalism or use as sitting points by pupils.

Pedestrian barriers may be appropriate to discourage pupils crossing the road adjacent to the build-out.

Use of chicanes or other horizontal deflection techniques to comply with the requirements contained in Section 1.

School crossing patrols (SCP) sites

School Crossing Patrols (SCPs) were established by the School Crossing Patrol Act 1953 and instituted on 1st July 1954 through the School Crossing Patrol Order 1954.

The Road Traffic Regulation Act 1984 (sections 26-28) gave 'Appropriate Authorities' (defined as county councils, metropolitan district councils, the Commissioner of the Metropolitan Police and the Common Council of the City of London) the power to appoint SCPs to help children cross the road on their way to or from school, or from one part of a school to another, between the hours of 8.00am and 5.30pm.

Section 270 of the Transport Act 2000, which came into force on 31 January 2001, amended the 1984 Regulations to permit Patrols to operate 'at such times as the authority sees fit', and to stop traffic to help anyone (child or adult) to cross the road, whether or not they are travelling to or from school.

Whilst there are Traffic Regulation Acts that cover the service, including the uniform and training, there are not any Acts that covers School Crossing Patrol sites. It could be interpreted then that sites require no formal works of any kind in order to be established. However, under the Health and safety at Work Act 1974 and the Management of Health and Safety at Work Regulations 1999 the Authority has a responsibility for the health and safety of its employees and also non-employees who may be affected by the work we do.

SCP site specifications

Detailed below are a summary of the highway measures which should be included at a site, as well as the ideal site. It is important to note, however, that before a new site is established it is subject to a safety audit check carried out by the Accident Investigation Unit who may request that additional measures to those detailed below are included at a site.

Basic site level requirements are as follows:

- Advance children crossing warning signs (Traffic Signs diagram 545) on each approach to the crossing. Where the SCP site is installed in isolation these signs should be mounted on high visibility diamond grade lime green backing boards.
- Dropped kerbs on both sides of the crossing of minimum width of 2.7m to allow pushchairs and people in wheelchairs easy access
- Keep clear carriageway markings on both sides of the road at the dropped kerbs. The length of the carriageway markings will be dependent upon each site but need to be of adequate length to advise cars not to park at this location and to ensure the Patrol has good visibility in all directions. The keep clear carriageway markings should be either:
 - a. double yellow lines where the crossing is at a junction and it is deemed appropriate
 - b. yellow zig-zag “school keep clear” markings where the site is outside a school pedestrian entrance, or
 - c. white “H” bar markings where neither of the above can be provided
- Automatic pre-programmed flashing amber warning lights
- Red surfacing on the carriageway on each approach to the site. The red surfacing should not, however extend across the whole width of the carriageway, and
- Where sites are located at pedestrian entrances to schools or at other locations where children may “spill” on to the carriageway, an appropriate length of pedestrian guardrail should also be installed.

Ideal site level requirements are as follows:

- ‘Gateway’ signing, i.e. advance children crossing warning signs (Traffic Signs diagram 545) on each approach to the crossing. These signs should be mounted on high visibility diamond grade lime green backing boards on through roads
- Dropped kerbs on both sides of the crossing of minimum width of 2.7m to allow pushchairs and people in wheelchairs easy access
- Tactile paving at the dropped kerbs
- Keep clear carriageway markings on both sides of the road at the dropped kerbs. The length of the carriageway markings will be dependent upon each site but need to be of adequate length to advise cars not to park at this location and to ensure the Patrol has good visibility in all directions. The keep clear carriageway markings should be either:
 - a. double yellow lines where the crossing is at a junction and it is deemed appropriate
 - b. yellow zigzag “school keep clear” markings where the site is outside a school pedestrian entrance, or
 - c. white “H” bar markings where neither of the above can be provided
- Automatic pre-programmed flashing amber warning lights

- Red surfacing on the carriageway on each approach to the site. The red surfacing should not, however extend across the whole width of the carriageway
- Children crossing warning markings (Traffic Signs diagram 545) on the carriageway on each approach to the site
- ‘Dragon’s Teeth’ markings along the edge of the carriageway on each approach to the site, and
- Where sites are located at pedestrian entrances to schools, or at other locations where children may “spill” on to the carriageway, an appropriate length of pedestrian guardrail should also be installed.

Road markings and signing

Road markings

General guidance and policy on the use of road markings is contained in the current Highway Network Management Plan.

Only red coloured surfacing is to be used on SRTS or SZ schemes in line with current guidance and policy contained in the current Highway Network Management Plan.

Adhesive road markings to diagram 545 (children crossing) are to be installed at the entrance to a school zone scheme or on the approach to a SCP site where this is being improved in isolation.

‘Dragon teeth’ or ‘countdown’ markings may be used where appropriate in all schemes.

Central hatching may be used to reduce the visual road width subject to a normal running lane of 3.25 metre (3.0 metre absolute minimum) remaining.

‘Zig-zag’ markings to diagram 1027.1 to be placed outside all school entrances and should be considered on both sides of the road where traffic flow is heavy or vehicle parking is an issue.

‘SLOW’ markings to diagram 1024 or speed roundels to diagram 1065 may be used where appropriate on all schemes.

Signing

The entrance to a school zone will be highlighted by the use of a ‘children crossing’ warning sign to diagram 545 together with a ‘School Zone’ supplementary plate. This is to be erected with a ‘lime green’ backing board. The use of the lime green backing board will be limited to the school zone entrance sign. However, if the scheme relates to the improvement of a SCP site in isolation, the advance warning sign will be provided with a lime green backing board.

All other signs within a SRTS, SZ or SCP scheme will use a grey backing board.

The use of amber flashing lights on school zone entrance signing will be limited to those sites that have restricted advance visibility and will be decided between Highways and Road Safety section.

The installation of vehicle-activated interactive road signs will be in line with the current policy and criteria contained in the Highway Network Management Plan.

APPENDIX 1

NCC Structure Plan Hierarchy	2001 Code of Practice Hierarchy	Notes (all references to hierarchy are from the NCC Structure Plan)
1 – Main Roads: All motorways, trunk roads and principal roads	1 and 2 – Motorways and Strategic Routes: Motorways, trunk roads and principal roads.	No traffic calming on category 1 roads.
2 – Major secondary roads: Major distributor roads.	3a – Main distributor roads: Major urban roads.	Linings schemes and gateways allowed. Vertical or horizontal deflections on category 2 or 3 roads on accident reduction grounds only and with approval of Cabinet Member.
3 – Other section roads: Minor distributor roads.	3b – Secondary distributor roads: B and C class roads and unclassified urban bus routes.	
4 – Local roads: Local distributor roads and access roads.	4a and 4b – Link roads and local access roads.	Traffic calming may be installed on environmental and accident reduction grounds. All approved horizontal or vertical deflection features allowed.

The above table provides a comparison between the definitions of road hierarchies contained in the current County Council Structure Plan and those found in the Highway Maintenance Code of Practice (2001)

APPENDIX 2

Your ref
Our ref
Please ask for
Tel
Fax
e-mail
Date

The Occupier

Dear Resident

NORTHFIELD ESTATE, MANSFIELD WOODHOUSE POSSIBLE TRAFFIC CALMING

A recent study has found a higher than average level of road accidents resulting in injury in the above area. Most of these accidents (63%) involved pedestrians or pedal cyclists and nearly all of them involved children.

In order to reduce these accidents we are considering introducing traffic calming in the area highlighted on the enclosed plan. This could involve a combination of road humps, commonly known as 'sleeping policemen' and square red cushions, similar to those used on Vale Road, Mansfield Woodhouse.

Traffic calming will:

- Reduce accidents
- Reduce vehicle speeds
- Create a safer environment for all road users

However, you should also be aware that traffic calming may:

- Cause discomfort to some people
- Cause minor delays to emergency service vehicles
- Cause lorries to sound louder, especially if empty

The introduction of traffic calming in your area requires the support of the local residents; no decisions have been made already. This is your opportunity to give us your view, so please fill in the attached questionnaire and return using the prepaid envelope provided, by 23 May 2003.

Yours faithfully

APPENDIX 2

The Occupier

Dear Resident

Cavendish Road, Foxhill Road, Coningswath Road, Highfield Drive, Prospect Road and Valley Road, Carlton

A recent study has found a higher than average level of road accidents resulting in injury on the above roads. Almost half of the accidents involved pedestrians or pedal cyclists.

In order to reduce these accidents we are considering introducing traffic calming on the roads highlighted on the enclosed plan. This could involve a combination of raised junction plateaus, road humps, commonly known as 'sleeping policemen' and square red cushions, similar to those used on Cross Street, Arnold.

The introduction of traffic calming in your area requires the support of the local residents; no decisions have been made already. This is your opportunity to give us your view, so please fill in and return the attached form to let us know what you think.

Traffic calming should:

- Reduce accidents
- Reduce vehicle speeds
- Create a safer environment for all road users

However, you should be aware that traffic calming may:

- Cause discomfort to some people
- Cause minor delays to emergency service vehicles
- Cause lorries to sound louder, especially if empty

Please let us know what you think by completing the attached form and returning it in the prepaid envelope by Friday 23 August 2002.

Yours faithfully

APPENDIX 2

NOTTINGHAMSHIRE COUNTY COUNCIL

**Cavendish Road, Foxhill Road, Coningswath Road, Highfield Drive,
Prospect Road and Valley Road, Carlton**

Traffic Calming Questionnaire

(Please tick appropriate box)

I **DO** want traffic calming

I **DO NOT** want traffic calming

Please make any comments.....
.....
.....
.....
.....
.....
.....

Signed..... Date.....

Address.....
.....
.....
.....
.....

Please return in the prepaid envelope provided by Friday 23 August 2002

APPENDIX 3

NOTTINGHAMSHIRE COUNTY COUNCIL BESECAR AVENUE, GEDLING TRAFFIC CALMING

NOTICE IS HEREBY GIVEN that the Nottinghamshire County Council in exercise of powers conferred by Section 90A and 90I of the Highways Act 1980 propose to traffic calm Besecar Avenue, Gedling.

The effect of this work will be the introduction of six pairs of 1.75 metre wide/75mm high speed cushions and 15mm high 'imprint' paving at Besecar Avenue cul-de-sac, Clifton Grove and Wollaton Avenue as well as each entry to Besecar Avenue itself.

Plans showing the intended locations of the speed cushions can be viewed at Gedling Library (Wollaton Avenue) or can be obtained on request to
..... on telephone number..... The location of the cushions are also marked on Besecar Avenue with a yellow 'X'.

Objections to these proposals should be received in writing by Monday 15 July 2002 at the address below.

Highways Manager
Highways Division (South)
Environment Department
Gamston Depot
Radcliffe Road
West Bridgford
Nottingham
NG2 6NP