PRIMAVERA

REVIEW OF CURRENT TRAFFIC CALMING TECHNIQUES

CONTENTS

1. ABSTRACT

1.1 Traffic calming is fundamentally concerned with reducing the adverse impact of motor vehicles on built up areas. The Netherlands, Denmark and Germany have led the way in Europe with early schemes implemented in the 1970's, and further techniques developed since then.

1.2 The most effective traffic calming measures for reducing vehicle speeds involve vertical shifts in the carriageway. Other measures may be used in supporting roles such as road narrowing, chicanes, islands etc. These measures are very dependent upon spacing for their effectiveness. 85 percentile speeds of less than 30kph may be achieved.

1.3 Studies have shown that traffic calming can reduce accident levels by up to 40%, and have a significant impact on reducing the severity of accidents. Air pollution can also be reduced.

1.4 Area wide traffic calming schemes seek to calm both main roads and residential roads, however main road traffic calming is still a relatively new concept, and generally does not involve the use of vertical shifts.

1.5 The use of traffic signals in traffic calming schemes has been very limited. A scheme involving the use of signals to "platoon" traffic through the town of Sowerby Bridge in England was proposed but has not been carried out.

2. INTRODUCTION

2.1 Traffic calming is largely still in its infancy. Although much information is now available on techniques for calming residential roads, there is less documentation available on measures suitable for main roads.

2.2 With reference to the Translation of the Dutch 30kph Zone Design Manual[1], and other documents, this report examines the various traffic calming techniques developed in Europe, and considers their suitability and effectiveness for implementation on both residential and main roads.

2.3 Reference is made to the potential for accident savings, reductions in noise levels, air pollution and vehicle speeds. However, it should be noted that while there is a significant amount of general information available on speed reductions and accident savings, there are few references to the results of before and after studies on specific schemes. In addition, it appears that little work has been undertaken on the effects of traffic calming on noise and air pollution.

3. BACKGROUND

3.1 Traffic calming has its origins in the Dutch "Woonerf" schemes of the 1970's, and since then has been further extended and refined throughout northern Europe, but particularly in Germany and the Netherlands.

3.2 The concept of traffic calming is fundamentally concerned with reducing the adverse impact of motor vehicles on built up areas. This usually involves reducing vehicle speeds, providing more space for pedestrians and cyclists, and improving the local environment.

3.3 The original "Woonerf" schemes introduced the concept of shared space between vehicle and pedestrian. Streets were reconstructed so as to tip the balance in favour of the residential function of the street and to reduce the domination of motor vehicles. Speed humps, chicanes, road narrowing, planting and other measures were introduced to both physically and visually reinforce the message that the motorist is only a guest in the area and that the residential function takes priority.

3.4 The wholesale reconstruction of streets required by the "Woonerf" was by necessity expensive, and since then this technique has been abandoned in favour of cheaper measures while still retaining the essential traffic calming concept.

3.5 Traffic calming techniques are now applied to whole areas of towns and not just to individual streets. Main traffic arteries, villages, shopping streets and town centres have all been included. Area wide traffic calming schemes seek to calm both the main roads and the residential roads in an area so as to ameliorate the impact of any traffic transfer as a consequence of traffic calming.

4. TRAFFIC CALMING TECHNIQUES

4.1 Traffic calming on links

4.1.1 General

Traffic calming schemes generally incorporate a wide range of measures designed to complement each other in both speed reduction and environmental terms. Schemes are designed to be self-enforcing, although the effectiveness of this varies according to the measures employed. The principle techniques used fall into four areas:

a) Vertical deflections
b) Horizontal deflections
c) Road narrowing
d) Central islands

The effects of these measures may be reinforced by a range of supporting measures.

4.1.2 Vertical deflections

Vertical shifts in the carriageway are the most effective and reliable of the speed reduction measures currently available. There are currently several different techniques available to achieve this:

a) Road hump
b) Plateau (speed table)
c) Cushion
d) Uneven road surface (rumble strips)

a) Road humps

Road humps may be of several varieties with rounded and flat topped being the most common. The latter are particularly suitable in providing crossing places for pedestrians. The width of humps may be restricted to allow the retention of existing carriageway drainage. If parking spaces are at a premium road humps may be preferable to other measures. Road humps are not recommended on bus routes because of the discomfort caused to passengers[2].

b) Plateau

Plateau extend the full width of the carriageway between the kerbs and extend over a longer length of road than humps. The surface should be of a different material to the carriageway and footways. Plateau are more suitable than road humps when the measures are implemented on bus routes. The length of the plateau should be sufficient to accommodate the full wheelbase of the bus to reduce passenger discomfort to a minimum.

c) Cushions

Cushions are raised portions of carriageway with a flat top only extending over part of the carriageway width. This allows cyclists and large vehicles such as

buses to pass unhindered, although this depends on the bus design as vehicles with double-rear wheels are affected by cushions.

d) Uneven road surface

Care should be taken in the use of rumble strips due to the increase in the level of noise and vibration and the difficulties they create for cyclists. As a technique they are perhaps more suitable for gateways where frontage property is limited.

Jiggle bars have been found to be ineffective in reducing vehicle speeds, and at some sites have increased speeds, as drivers discover that the effect of the bars is more limited at higher speeds.

The spacing of the measures is critical to their effectiveness. In general the closer the spacing the greater the reduction in vehicle speed. A spacing of 40-60m will generally result in an 85 percentile speed of 30kph[3].

4.1.3 Horizontal deflections

Horizontal shifts in the carriageway are less effective than vertical ones in achieving reductions in speed, however their impact is significantly increased when used in combination with a vertical shift. Essentially all horizontal shifts may be classified as chicanes.

The speed reducing impact of chicanes is reduced if the measure has to allow for the passage of HGVs as the wider carriageway allows car drivers to take a "racing line". The use of stone sets or similar as a side strip can be useful in allowing the passage of large vehicles while discouraging cars.

Half chicanes have been found to increase vehicle speeds if traffic levels are low, as drivers feel uneasy crossing to the other side of the road and tend to speed up[4].

Chicanes significantly reduce parking spaces and should therefore be avoided if spaces are at a premium. Additionally they should not be dependent upon parked cars for their effect.

4.1.4 Road narrowing

Road narrowing may be considered as another supportive measure to vertical deflections. It cannot be considered as a speed reducing device in itself, but it can act as a reminder or encouragement to drive slowly or calmly.

Narrowing the carriageway at specific locations, for example in combination with speed tables, is an effective way of combining measures to increase their effect. If the carriageway width is reduced to a single lane by the narrowing the effectiveness of this technique in speed reduction is further increased. However, this is largely dependant on the balance of the opposing traffic flows.

On narrowed two-way roads occasional strips at the edge of the carriageway may be used to allow large vehicles to pass. If these are constructed in sets or similar materials car drivers will avoid using them. This can however cause problems for cyclists unless smooth materials are used, which in turn makes the narrowing less effective.

The extra space created by road narrowing is generally used to provide some combination of widened footways, dedicated cycleways and formalised parking bays, or to provide more space for public transport, for example by allowing the use of bus lanes.

4.1.5 Central islands

Central islands have only a limited effect on reducing speeds unless combined with another measure such

as a chicane. They do however provide useful pedestrian refuges.

4.1.6 Supporting measures

A number of supporting measures are commonly used to back up the speed reducing techniques. The use of different surface materials, the planting of trees and the use of street furniture falls into this category. However, as independent measures they generally have little effect on traffic speeds.

4.2 Traffic calming at junctions

4.2.1 Vertical deflections

Raised junction areas (plateau), flat top road humps and cushions are effective speed reducing measures at junctions. Treatment of junction corners by the use of an uneven road surface is useful for slowing down turning traffic, particularly HGVs, however this has no effect on vehicles going straight ahead.

4.2.2 Changes in alignment

This technique involves narrowing the carriageway in the vicinity of a junction so that all moves through the junction have to deviate from a straight ahead path. This measure is fairly effective in reducing the speed of straight through traffic, however junction priorities may become confused as the boundaries of the junction are less recognisable.

4.2.3 Reduction of the junction area

The area of a junction may be reduced by building out the footways. This is carried out on junction corners at crossroads or T-junctions. In addition the footway may be built out along the straight at a T-junction. The latter technique is suitable for reducing the speed of straight ahead vehicles, while the former is only effective for turning vehicles.

4.2.4 Islands

The provision of islands on the approaches to a junction has only a limited effect on vehicle speeds. They will however improve the situation for pedestrians by creating a refuge, although by reducing the amount of carriageway they may hinder large vehicles when turning.

4.2.5 Special junction forms

Roundabouts and mini-roundabouts may be useful in reducing traffic speeds at junctions. The latter is suitable when available space is limited, however, if no vertical elements are placed on the island the speed reducing effect will be more limited. A ramped area around a central island allows large vehicles more turning space.

An alternative junction form is the bayonet junction. This technique turns a crossroads on a wide road into two adjacent staggered T-junctions, significantly reducing vehicle speeds on the offset road. It has no effect however on the untreated road.

4.3 Gateways

4.3.1 Gateways at junctions

The entrance to a traffic calmed area requires special attention to make it clear to drivers that the area

they are entering has speed restrictions and conditions very different from the surrounding network.

Measures used to achieve this effect include:

a) Plateau or flat topped road humps
b) Different surface materials
c) Road narrowing
d) Traffic island/ghost island
e) 30kph/20mph signs if appropriate

If the junction is signal controlled the gate should be set back from the junction.

4.3.2 Gateways on links

Similar techniques to those at junctions are employed on links. One negative effect of this is that route choice is not strongly influenced, compared to siting the gateway at a junction.

4.4 Traffic management measures

4.4.1 Traffic management on links

Road closures and one-way streets are regarded as very much a last resort in terms of traffic calming as they restrict the choice of routes available for local access traffic. However, they can be very effective in removing through traffic. Problems may arise if turning heads become used as parking areas.

If the link is too narrow to allow the construction of a turning head a road closure would be generally inappropriate.

A number of measures are available to create road closures for general traffic while retaining access for buses and/or cyclists. Raised or lowered cushions allow buses to pass unhindered, while the latter in particular will prevent the passage of narrower vehicles. However, the bus gate cannot prevent the passage of HGVs, and raised cushions allow cars to pass albeit at a reduced speed. Buses with double-rear axles are also affected by cushions.

4.4.2 Traffic management at junctions

In general these measures all allow access for cyclists to be retained. Techniques include local road narrowing in the vicinity of the closure, the use of different surface materials, and adequate provision of posts at the closure to prevent motorists driving across the islands.

4.5 Traffic calming on main roads

4.5.1 Techniques for traffic calming main roads are not as well developed as for 30kph areas. Changes in level on these roads are often regarded as unacceptable, although examples do exist. Without the option of using vertical shifts, the most effective speed reducing measures are removed from the traffic calming armoury, lessening the potential for achieving slower traffic and reduced accidents.

4.5.2 Common techniques employed on main roads in urban areas include:

a) Road narrowing
b) Islands
c) Tree planting

Some schemes include the use of road humps, cushions or plateau. The latter may be used to provide pedestrian crossing points. The use of rumble strips in at least one scheme increased road noise to such an extent that they were later removed[5].

The space provided by road narrowing has been generally used to create parking bays and to widen footways. Cycleways tend to be included in Continental schemes.

4.5.3 In Germany main road traffic calming is often carried out in cities as part of area-wide schemes. Main roads are classified as 50kph roads and the secondary network as 30kph. Bus lanes and measures to allow improved egress from bus stops into the main traffic stream have been included.

4.5.4 The success of main road traffic calming schemes seems to revolve around creating an improved pedestrian environment rather than significantly reducing vehicle speeds. It is perhaps significant that schemes in Eindhoven and Cologne have retained light controlled pedestrian crossings[3].

4.5.5 Techniques used to control traffic by the use of traffic signals include holding back traffic on a radial to avoid saturating downstream junctions. Applying this technique to a main radial as part of a area-wide traffic calming scheme could be used to reduce queuing within the calmed length of road. Physical speed reducing measures would be required to prevent traffic from speeding up once the restraining effect of the congestion was removed. In addition, this technique may increase rat-running.

4.5.6 When signalled junctions are relatively close together they may be linked to provide a "green wave" for main traffic movements. This linking may also be used to achieve a "calm" driving speed of 40 kph. Drivers exceeding the linking speed would hit a red light and would have to wait for the other traffic to catch up. Regular road users would soon realise the benefits of driving at the appropriate linking speed.

4.5.7 Appendix A includes a number of examples of main road traffic calming schemes in several European countries.

5. EFFECTIVENESS OF TRAFFIC CALMING MEASURES

5.1 Speed reduction

Vertical shifts in the carriageway have a greater impact on vehicle speeds than any other measure. Provided that the humps or ramps are spaced sufficiently close together, an 85 percentile speed of less than 30kph is achievable. Spacing should not be greater than 60m, and in general the height of the shift should be 100mm. Ramps with a shallow gradient need to be placed closer together than steeper gradients to achieve the same effect. For example 1 in 10 gradient ramps at 40m intervals have the same speed reducing effect as 1 in 7 gradient ramps at 60m intervals[3].

Other measures such as lateral shifts, carriageway constrictions, roundabouts, small corner radii and changes in priority have an impact on vehicle speeds, but the 85 percentile speed generally remains above 30kph, although average speeds may be below the 30kph threshold[3].

Table 1 gives an indication of the relative speed reductions achievable from a number of traffic calming measures. The "before" situation refers to a road with a 48kph sped limit.

	Upper limit of Maximum speed (kph)		Upper limit of 85 percentile speed (kph)		Range of Average speed (kph)	
	Before	After	Before	After	Before	After
Vertical shifts in the carriageway	100	40	75	30	45-65	18-25
Lateral shifts in the carriageway	100	65	75	45	45-65	22-35
Road narrowing to a single lane	100	65	75	45	45-65	22-35
Roundabout	100	65	75	45	45-65	22-35
Road narrowing to a reduced width	100	95	75	70	45-65	40-55
Central islands	100	95	75	70	45-65	40-55

TABLE 1 : EXPECTED SPEED REDUCTION EFFECT OF VARIOUS TRAFFIC CALMING MEASURES
(Interpreted from the Devon County Council Traffic Calming Guidelines[3])

A recent survey of 35 British calming schemes, with the majority including vertical shifts in the carriageway, found that the average reduction in the 85 percentile speed was 16kph[6].

5.2 Accident reduction

The impact of traffic calming schemes on accident levels is generally related to both the speed reducing effect of the scheme, and on any reduction in traffic levels as a consequence of it. Slower vehicle speeds not only reduce the occurrence of accidents, but also have a significant effect on their severity.

Over the past ten years pedestrian fatalities in West Germany have fallen from 6.2 per 100,000 population to 2.3. This has been largely attributed to lower vehicle speeds in urban areas, primarily as a consequence of heavy investment in traffic calming[7]. An overall reduction in personal injury accidents of 41% has been achieved with the Berlin Moabit scheme, with a reduction in fatalities of 57%, and serious injuries of 45%[8].

A review of 600 traffic calming schemes in Denmark has indicated that there has been a reduction of 43% in casualties compared with untreated areas.

5.3 Noise reduction

The noise reducing effect of traffic calming is mainly related to changes in traffic levels caused by the scheme, for example the removal of rat-runners. However, the carriageway layout and surface materials used may also have an effect.

Experience has shown that reductions in vehicle speed may also lead to reductions in noise, although excessive use of low gears and frequent acceleration and deceleration may increase noise levels. Thus a scheme with measures that allow the constant use of 3rd gear will result in lower noise levels than a more severe scheme that require frequent changes to 2nd gear. In this case the higher average speeds achieved with the former would have to be traded off against the higher noise of the latter. Where speeds have been reduced from 50 to 30kph, typical reductions in noise levels of between 4-5 dBA have been measured[8].

Where speed reductions of less than 10kph have been achieved, for example in various schemes in Danish villages, there has been little impact on noise levels.

Rumble strips are a traffic calming measure that often cause problems because of noise levels. It has been shown that granite setts result in noise levels between 3-5 dBA higher than smooth asphalt, even if restricted to a small area of carriageway such as in a rumble strip. However if speeds are restricted to below 20kph the differential is much reduced.

On roads with a high proportion of HGV traffic, noise problems may occur if road humps are used, particularly if lorries are empty or only part loaded[4].

5.4 Air pollution

The effect of traffic calming on air pollution is similar to its effect on noise levels. Air pollution has been shown to be less when vehicle speeds are at 30kph than at 50kph, however the style of driving has a great impact upon this. Thus "calm" driving in 3rd gear results in lower Carbon Monoxide and Hydro Carbon emissions than "aggressive" driving in 2nd gear. However, the same survey showed that Nitrogen Oxide levels were lower in the latter case[8].

In Buxtehude, Germany, monitoring of vehicle emissions before and after the implementation of traffic calming indicated a reduction in Carbon Dioxide levels of 20%, a reduction in Hydrocarbons of 10% and a reduction in Nitrogen Oxide of 33%.

6. PUBLIC CONSULTATION

6.1 Public consultation is an area that is sometimes neglected, however, it is perhaps one of the most important techniques for achieving effective traffic calming. The key to successful traffic calming is acceptance by the local community, and this can only be achieved by involving them in the preparation, design and implementation of the scheme.

6.2 Consultation at an early stage in the process is useful in determining the perceived problems in an area, and in defining the objectives of the scheme. Following on from this a second stage of the consultation process may be used to seek local views on the proposed works and resolve any conflicts that may arise.

6.3 Formal consultations with such bodies as the Police, Fire and Ambulance services together with bus operators and the statutory undertakers should also be carried out. The emergency services in particular may be opposed to any scheme that will slow down their vehicles. Tests in Britain have shown that each road hump encountered adds six seconds to the journey time of a fire engine[9].

6.4 The importance of public consultation is illustrated by the example of Ingolstadt in Germany where it was carried out at a late stage and generated considerable opposition to the proposed schemes. Shopkeepers in particular were very much against the proposals. However, once the initial schemes were completed it became easier to "sell" further schemes as existing examples were available.

6.5 A similar change in the public's attitudes to traffic calming is found in the German town of Buxtehude. Surveys before and after the implementation of a scheme found 46% of car drivers and 49% of residents opposed to the project prior to its construction, and yet three years later 67% of car drivers and 76% of residents were in favour[8].

6.6 The public's perceptions of an area can be also changed by the introduction of traffic calming. In particular the feeling that the environment is safer following the introduction of a scheme. In the Danish town of Vinderup surveys found a marked change in the perceived safety of the road: 80% of adult pedestrians felt safe afterwards compared with 51% beforehand; similarly 75% of cyclists and 76% of car drivers felt safe with the scheme compared with 17% and 56% respectively prior to the traffic calming being carried out[8].

6.7 In the Netherlands a survey of some 2000 residents in Woonervan found that 84% of respondents said their street was more pleasant to live in than before.

6.8 The attitude of drivers towards an area can also be affected in that if a street gives the appearance of a residential environment then drivers are more tolerant and careful of pedestrian activity within it.

7. THE COST OF TRAFFIC CALMING

7.1 The cost of traffic calming measures varies considerably from country to country and scheme to scheme. Where considerable environmental measures are used to complement the physical measures the cost rises significantly. The original Dutch "Woonerf" required the reconstruction of the street and the removal of kerbs and footways to achieve a common shared space and were therefore very expensive, typically over £25 per square metre of road in the mid 1980's[8].

7.2 An indication of traffic calming costs, based on mid-1980's prices, from a selection of schemes in the Netherlands and Germany, range from under £1 per square metre of street area to over £100. The "standard" traffic calming techniques such as plateau, gateways, junction treatments and planting fall into the £5-20 per square metre range[8].

7.3 In Britain Kent County Council quote prices of £700-1,000 for a single road hump, including signing and marking, but not lighting. Block paved ramped narrows are quoted at £3,000 for single way and £5,000 for two-way[4].

7.4 Recent estimates by Leeds City Council for plateau range from £6,000-15,000 per measure, with the former requiring no road narrowing or re-kerbing and being constructed in standard bitumen, while the more expensive measure would include for re-paving and re-kerbing to narrow the road, and construction in block paving or asphalt.

8. CONCLUSIONS

8.1 The most effective traffic calming measures for reducing vehicle speeds involve vertical shifts in the carriageway such as road humps, plateau and cushions. These measures are very dependent upon spacing for their effectiveness. At a spacing of 40-60m, 85 percentile speeds of less than 30kph may be achieved.

8.2 Other measures may be used in supporting roles such as road narrowing, chicanes, islands etc., however, these measures are less effective in reducing speeds when used in isolation.

8.3 Studies have shown that traffic calming can reduce accident levels by up to 40%, and have a significant impact on reducing the severity of accidents. Air pollution can also be reduced, although detailed information on this is limited.

8.4 Noise reduction through traffic calming is mainly related to reductions in traffic volumes, however the type of measures employed may create problems with noise levels. These are exacerbated if there is a high proportion of HGV's.

8.5 Area wide traffic calming schemes seek to calm both main roads and residential roads, however main road traffic calming is still a relatively new concept, and information on this is limited. Generally schemes on main roads do not make use of vertical shifts, and therefore significant reductions in vehicle speeds are harder to achieve.

8.6 In view of the shortage of published information on main road traffic calming it is recommended that further studies should be undertaken into this area.

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APPENDIX A

EXAMPLES OF TRAFFIC CALMING ON MAIN ROADS

Borehamwood - Shenley Road (England)[1]

An experimental traffic calming scheme has been implemented on this road through the town centre of Borehamwood. The road carries some 18,000 vehicles per day. Conditions for pedestrians have been improved and vehicle speeds reduced.

Measures include:

- Road narrowing
- Islands
- Flat top humps used as pedestrian crossing points
- Replacement of traffic lights by mini roundabouts

Buxtehude (Germany)[1,2]

Buxtehude is a town with a population of 30,000. An area-wide scheme was implemented in 1987 to create a self-enforcing speed limit of 30kph. The final cost worked out at £4.60 per square metre (including footways). Speeds have been reduced to an 85 percentile value of slightly more than 30kph, however a "calm" style of driving has been achieved. Accident severity has been considerably reduced, though the number of light damage accidents has increased, together with the number of accidents involving cyclists. There has been a marked change in the attitude of both drivers and residents towards what vehicle speeds are acceptable in residential areas.

Measures used include:

- Road narrowing
- Speed tables
- Raised crossings at junctions
- Redesigned on-street parking

Cologne - Kalker Strasse (Germany)[1]

Kalker Strasse is a main radial road with intensive shopping, commercial and apartment uses. Following the opening of a new radial road the traffic function of Kalker Strasse has been downgraded. A one-way section has eliminated west-bound through traffic such that it has been reduced from 27,000 vpd to 13,000. There has been some speed reduction, especially during shopping hours, however accident trends have been disappointing.

Measures include:

- Road narrowing (18m to 7m)
- One-way section
- Parking provision
- Loading lane
- Tree planting
- Light controlled pedestrian crossings

Eindhoven - Leenderweg (Netherlands)[1]

Traffic calming on adjacent roads has forced rat-running traffic onto this main radial. Suburban shopping and commercial activities occur along much of its length, together with housing. Traffic calming has succeeded in moderating vehicle speeds, and made crossing easier for pedestrians at an overall cost of £320,000 for a 0.5km length of road.

Measures here include:

Road narrowing
Parallel service/parking road
Cycleways
Light controlled pedestrian crossings
Islands
Tree planting

Hellerup (Denmark)[3]

In Hellerup a main road carrying 20,000 vehicles per day has been calmed over a length of several kilometres. Road humps have not been used, however speeds have been reduced, although safety problems apparently remain[5].

Measures here include:

Road narrowing
Frequent pedestrian crossings
Offsets
Cycle track

Ingolstadt (Germany)[3]

Main road calming here has been ineffective, in part due to the use of rumble strips which were later removed due to complaints about the noise.

Measures included:

Central islands
Pedestrian crossings protected by rumble strips
Tree planting
Bus stops organised so that buses using them would block the carriageway

Langenfeld (Germany)[1,2]

Langenfeld is a town of about 50,000 inhabitants. Its main street carries about 10,000 motor vehicles per day together with buses and some 3,000 cycles. Speeds have been reduced to under 40kph in the vicinity of the cushions and conditions for pedestrians have been improved, although the specially designed crossing places are not always used. Parking in defined on street spaces also helps to keep speeds down by interrupting the flow of traffic.

Traffic calming measures used to reinforce a 40kph speed limit are:

Road narrowing
Cushions
Raised junctions
Islands
Cycle lanes

Rennes - route de Nantes (France)[4]

Prior to traffic calming this 2 x 2 lane road carried 15,000 vehicles per day and acted as a barrier between housing on one side and local facilities on the other. The scheme was completed in 1987 at a cost of 5.170M French francs.

Measures include:

Road narrowing
Islands
Chicanes
Mini roundabout
Service road
Cycleway
Tree planting

Sowerby Bridge (England)[5]

In 1987-88 the Institute for Transport Studies at Leeds University carried out a study on behalf of the Civic Trust into traffic calming a main road through Sowerby Bridge, West Yorkshire, by a combination of traffic signals and other measures. The maximum two way traffic flow recorded on this road was 1600 vehicles per hour.

The proposals involved forming traffic platoons outside the main shopping area using traffic signals, and by careful timing allow the traffic through the town so as to leave significant gaps for pedestrian crossing movements. The design of the platoon control was based on a running speed between control points of 30kph.

For a variety of reasons however, these proposals have not been carried out.

Proposed measures included:

Signal control
Road narrowing
Speed tables

Vinderup (Denmark)[3,6]

The through road in this small town has been traffic calmed, leading to a reduction in accidents of 50%, although noise levels and air pollution remain unchanged. Rumble strips have however been removed due to complaints from residents about the noise. The scheme cost £0.8M in 1984/85. Resident drivers and those aged under 50 with small cars are generally in favour of the scheme, with non-resident drivers and those aged over 50 with large vehicles against.

Remaining measures include:

Pre-warning rumble strips
Road narrowing
Islands
Increased pedestrian crossings
Footway build-outs
Cycleways
Planting/landscaping

Wandsworth - St John's Hill (England)[1]

St John's Hill is a busy inner London Street with a mixture of shopping and commercial usage. Two way traffic flows on this road exceed 2,000 vehicles per hour in the morning peak. The scheme was completed in 1990 at a cost of £440,000 excluding the cost of design and supervision.

Measures include:

Road narrowing
Islands at pedestrian crossings
Parking bays
Ramped side road entrances
Tree planting

APPENDIX REFERENCES

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