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REVIEW OF TRAFFIC CALMING SCHEMES IN 20 MPH ZONES

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Project: Monitoring of 20 mph Zones (S204F)

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EXECUTIVE SUMMARY

This Report reviews the effect of traffic calming using 20 mph zones. Since December 1990 local authorities have been able to apply to the Department of Transport for authorisation of 20 mph speed limit zones. Initially, these are for a temporary period of up to 18 months, to allow the authority to build the measures and ensure that the average speeds are at or below 20 mph as defined in Circular Roads 4/90. If the speed criteria is achieved then permanent 20 mph zone status would normally be granted by the Department of Transport.

Two hundred schemes have now been installed in the UK and eighty-two of them have been granted permanent status.

The most quoted reason for applying for an authorisation for a 20 mph zone was accident reduction (60 per cent), indicating that safety is seen as the main justification for implementing a scheme. Most of the zones (80 per cent) are in predominately residential areas, with about 10 per cent of the remainder being in town or city centres.

The largest 20 mph zone is the Camp Hill and Stockingford area of Nuneaton which has a total area of 2.5 sq.km. The smallest is Maling Park in Sunderland, at 0.015 sq.km. with a road length of 313 metres. Excluding the linear sites, such as High Streets, the average size of the zones is 0.28 sq.km.

The average length of road with calming measures, is about 2.5 km per zone. There were an average of 29 calming measures per scheme thus giving an overall average

spacing between the speed measures of about 85 metres. The most common measures used are round-top humps (52 per cent), followed by flat-top humps (30 per cent), then raised junctions and speed tables (10 per cent). Speed cushions are used in some of the more recent schemes. Chicanes were rarely used except in combination with humps or tables.

The 20 mph zone concept has been successful in substantially reducing speeds and accidents in the areas where they have been applied. Detailed conclusions from this study are:-

- 1) Comparisons of 'before' and 'after' accident data, show that the average annual accident frequency fell by about 60 per cent.
- 2) Child pedestrian and child cyclist accidents fell by 70 and 48 per cent respectively after the schemes were installed giving an overall reduction of 67 per cent for all child accidents. The reduction in accidents for all cyclists was 29 per cent.
- 3) Speed data provided showed that the average speed 'at a calming measure' was 13.2 mph and the average speed 'between calming measures' was 17.8 mph, indicating that the calming measures are effective in physically enforcing the 20 mph speed limit. Overall vehicle speeds fell, on average, by 9.3 mph.



Neg. no. CR313/93/24

An example of an entry to a 20 mph zone

- 4) There was a 6.2% reduction in accidents for each 1 mph reduction in vehicle speed.
- 5) Traffic flows were reduced on average by 27% in the zones, and there were increases on the surrounding roads of approximately 12%. The larger decreases were at six of the schemes which had bypasses constructed just before the 20 mph zones were implemented.
- 6) Accident migration onto the surrounding roads was not found to be a problem, but care should be taken in the design of schemes to avoid traffic transferring to unsuitable routes.
- 7) Public acceptability surveys were carried out in 6 of the zones. The overall reactions from residents were generally in favour of the schemes. There were some unfavourable comments by some residents regarding some of the measures but they were a minority view.

REVIEW OF TRAFFIC CALMING SCHEMES IN 20 MPH ZONES

ABSTRACT

Traffic calming measures are used to reduce vehicle speeds and consequently accidents. To encourage the use of such measures by Highway Authorities, the 20 mph Zone initiative was introduced by the Department of Transport in December 1990. The first three zones, in Sheffield, Norwich and Kingston-Upon-Thames, were implemented in January 1991 and there are now over two hundred 20 mph zones in England. This report assesses the scheme designs and gives more detailed descriptions of 6 schemes. Comparisons of 'before' and 'after' data for injury accidents and speeds are given as well as the relationship between accident reduction and speed reduction. The 20 mph zones have successfully reduced accidents by about 60 per cent and vehicle speeds by over 9 mph. Public acceptability surveys were carried out in six zones and the reactions from residents were generally in favour of the schemes.

1. INTRODUCTION

In 1987 the Secretary of State for Transport announced a target for reduction of road casualties by one third of the average 1981-1985 figure by the year 2000. It was intended that many different approaches would be used to contribute towards the achievement of this target, one of the important fields for action being highway engineering.

Research has shown that a reduction in vehicle speeds generally leads to a reduction in the number and severity of accidents, (Finch et al, 1994). There are a number of ways in which such speed reductions can be achieved and one of the initiatives taken by the Department of Transport was the concept of '20 mph zones'. The Department allowed, and indeed encouraged (DOT, 1991), local authorities to apply for authorisation to introduce 20 mph speed limit zones and funds were made available through the Transport Supplementary Grant to construct such zones where they were being introduced to address a casualty problem (DOT, 1995).

Previous papers by Hodge (1992), Mackie et al (1993) and Mackie and Webster (1995), described the early schemes and gave preliminary results. This report reviews all of the 20 mph zones schemes now installed or in preparation, describes their major characteristics, and considers the effect they have had so far on reducing injury accidents particularly to vulnerable road users such as children and cyclists.

Figure 1 shows the distribution of the zones used in the accident data analysis, indicating that many urban areas of the country have now introduced schemes. A full list of all of the 20 mph zones (at 11/4/96) is given in Appendix A.

Other European countries have also introduced 20 mph (30 kph) zones particularly Holland (Lines and Castelijns, 1991), France (Cetur, 1992), Germany, Denmark and Austria (Wernsperger and Sammer, 1995). Most schemes use engineering measures to enforce the limit, though some rely on signing and police enforcement only.

2. AUTHORISATION

2.1 GENERAL

A 20 mph zone is generally suitable for an urban area where the legal speed limit needs to be reduced from an existing 30 mph limit. To reduce speeds to 20 mph, however, the use of speed limit signs alone is not considered sufficient. Physical engineering measures to restrain speed also need to be installed and highway authorities are required to demonstrate to the Department of Transport that such measures are effective before schemes can be permanently authorised.

Temporary authorisation of the zones is therefore given for an initial trial period of 18 months, after which permanent status can be gained, if the average traffic speeds can be shown to have been reduced to less than 20 mph (DOT, 1990).

Each entrance to the zones must be indicated by signing (DOT, 1993) and a gateway entry treatment feature (DOT, 1994). The signing of calming measures within the zone is then not necessary, thus dispensing with the need for some of the signing that otherwise would be required, which can be expensive and intrusive.

3. SCHEME DESIGN

3.1 REASONS FOR SCHEMES

The most quoted reason for applying for a 20 mph zone was accident reduction (60 per cent), followed by speeding (19 per cent), then rat-running ie. using the area as a short-cut (13 per cent). The remaining reasons concerned high traffic flows and environmental problems. Accidents and safety, rather than the creation of a more pleasant environment to

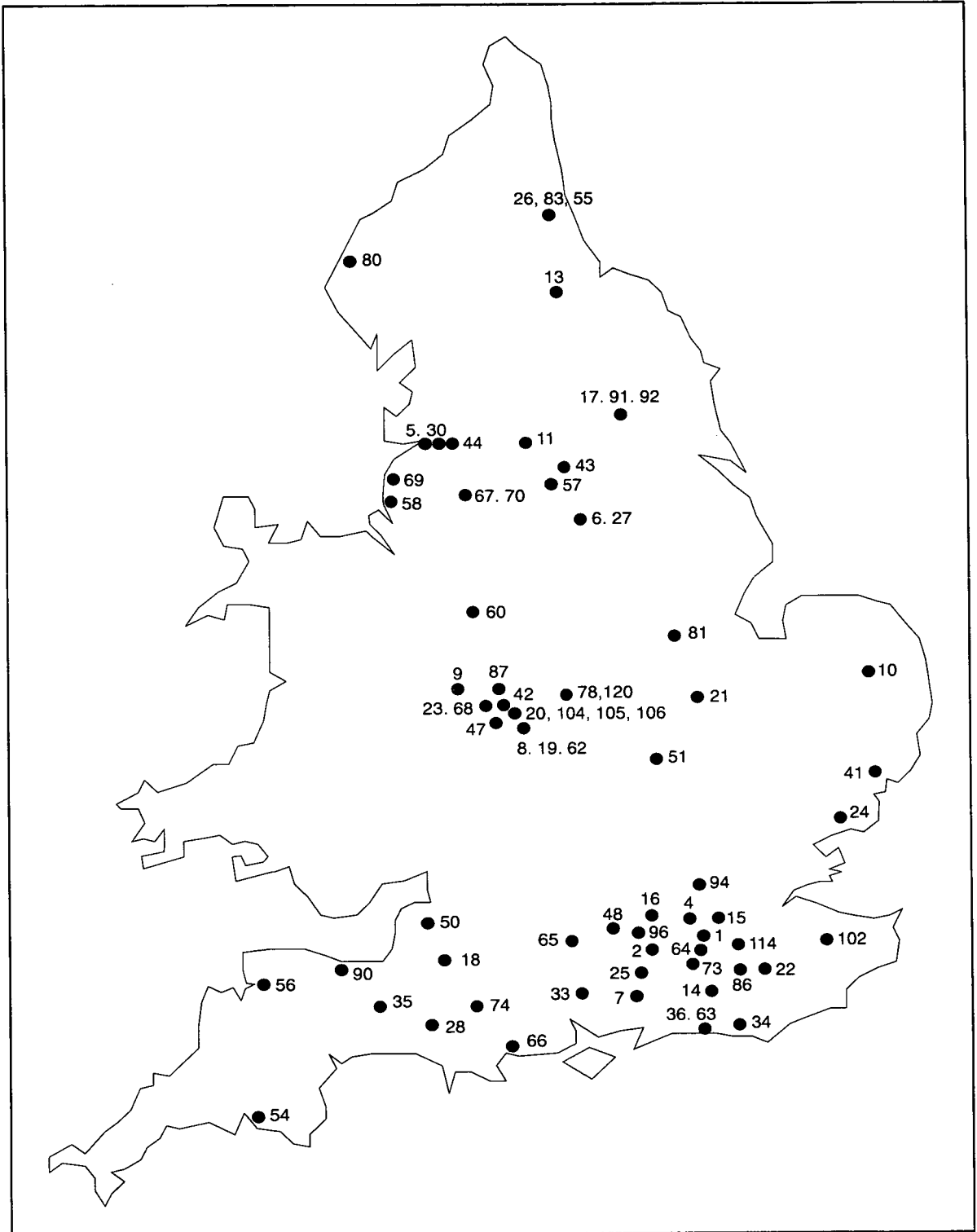


Fig.1 20mph zones geographical distribution

live in, are therefore seen as the main justification for scheme implementation.

3.2 TYPES OF SCHEMES

About 80 per cent of the zones are in predominately residential areas, including four villages. The remainder are in shopping and commercial areas including 10 per cent in city or town centres. Fifteen per cent of the zones, including the village schemes, could be described as linear, being single roads. Half of the schemes have bus routes running through them. There is a trend to a higher proportion of schemes containing bus routes in the more recent applications, and also a higher proportion of area schemes (at the expense of linear schemes).

The percentage of zones which are predominantly made up of residential access roads is about 80 per cent, with a few schemes covering only local distributor roads. Few new residential developments have been designed as 20 mph zones but they would be appropriate for 20 mph zones.

3.3 TYPES OF MEASURES

A wide variety of measures (see Section 4) were used in the 20 mph zones. The most common measures were round-top humps (52 per cent of measures installed) and flat-top humps (30 per cent) which were mainly 75 or 100 mm high. Raised junction tables accounted for 10 per cent and sets of speed cushions for 4 per cent, with the remainder of the measures being pinch-points, chicanes, mini-roundabouts and rumble strips. Some of the tables and humps have chicanes and pinch-points incorporated. The types of measures used in 6 of the zones are discussed in more detail in section 4. It should be noted that there are now a wider variety of measures which can be used for traffic calming and authorities sometimes use speed cushions rather than humps, so as to have less effect on the comfort of bus passengers, while still keeping the speed of cars low (See 4.6).

3.4 SPACING OF MEASURES

Research at TRL (Webster, 1993) produced a relationship between speed and the spacing between measures, indicating that measures generally need to be less than 100 metres apart to achieve speeds which comply with the 20 mph zone guidelines. For example, to obtain an average speed of 20 mph midway between 100 mm high circular profile humps, the latest measurements predict a separation of less than 85 metres.

This information on speed and spacing of measures was taken into account when temporary authorisations were given.

Speed cushions, 75 mm high and 1600 mm wide, have been shown (Layfield, 1994) to give crossing speeds of about 19 mph whereas 1800 - 1900 mm wide cushions give speeds

of about 14 mph and are therefore not generally as effective as 100 mm high humps, which give mean crossing speeds of under 14 mph.

It has been shown (Webster & Layfield, 1996) that 75 mm high road humps can be almost as effective as 100 mm high road humps for both round-top and flat-top humps and are generally recommended as they also help to limit grounding problems arising.

3.5 LENGTHS OF ROADS

The maximum length of road comprising one zone was 25 km (Zone No.77, East Dene area of Rotherham) and the minimum was 190 metres (Zone No.33, Upper Brook Street, Winchester). The average length of road in each zone was 3.3 km. The total length includes all roads within the zones, some of them being culs-de-sac which are too short to require speed reducing measures. The average length of road with calming measures is about 2.5 km giving an overall average spacing between measures of 85 metres.

3.6 SIZES OF SCHEMES

The largest 20 mph zones are the Camp Hill and Stockingford (Zone Nos. 78 and 120) zones in Nuneaton, which have a combined area of approximately 2.5 sq.km. The smallest zone is 0.015 sq.km (Zone No. 93, Maling Park Sunderland), a small housing development with a road length of 313 metres.

Excluding the linear sites, the average size is 0.28 sq.km.

4. DETAILED SCHEME EXAMPLES

4.1 BIRMINGHAM, SMALL HEATH

The Birmingham, Small Heath zone (Zone No. 20) shown in Fig 2 is a relatively large residential area (Proctor, 1991) and covers an area of 0.55 sq.km with a total road length of 10.1 km. There are a total of eighty 100 mm high flat-top humps, eleven 50 mm high flat-top humps and 3 speed cushions. The lower height humps and the speed cushions were used because the fire service were concerned about the effect on their response times. The bus companies were also concerned with the effect on their services in St Benedicts Road, Somerville Road and Charles Road, so speed cushions, chicanes and 50 mm high humps were used (Fig 3) to assist them.

The scheme was completed on 7th August 1992 and it has been one of the most successful at reducing speeds and accidents (see sections 5 and 6). The overall accident frequency has been reduced from 19.33 per year to 4.59 per

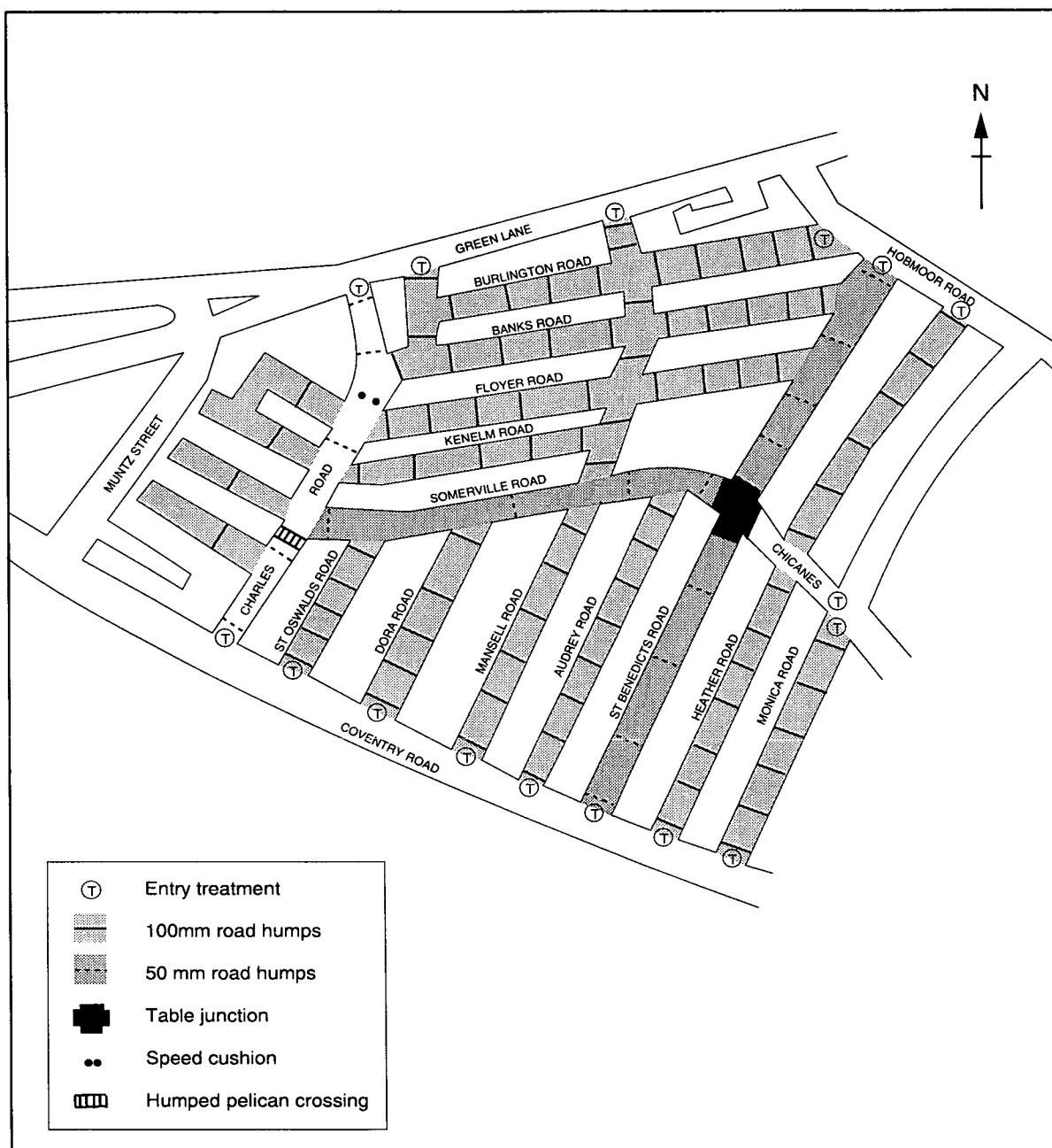


Fig. 2 Plan of Small Heath, Birmingham

year giving a reduction of 76%. Child accidents have been reduced by 70%. The representative speed monitoring locations (DOT, 1990) gave average vehicle speeds of 13.9 mph at the 100 mm high hump sites, 14.5 mph at the 50 mm high hump site, 15.9 mph at the speed cushion site and 18.5 mph at a speed table/chicane site.

The scheme cost approximately £200,000 and permanent 20 mph zone status was granted by the Department of Transport on 16th July 1993.



Neg. no. CR312/93/22

(a) 20 mph zone entry to Small Heath, Digby



Neg. no. CR312/93/16

(b) Humped pelican crossing on Charles Road

Fig.3 Birmingham, Small Heath 20 mph zone



Neg. no. CR312/93/6

(c) Chicane with angled cushion on Somerville Road



Neg. no. CR312/93/21

(d) Cushions and narrowing on Charles Road

Fig.3 cont. Birmingham, Small Heath 20 mph zone

4.2 BRIGHTON, HANOVER

The Brighton, Hanover zone (Zone No. 36) shown in Fig 4 is a residential area which was included in the "Feet First/A Step Ahead" initiative set up in 1992 by Transport 2000 and the Local Authority Associations, to promote traffic management schemes which made the environment more friendly to pedestrians. It was built in 3 phases. Phase 1 was completed in June 1992, covered 0.125 sq.km. and consisted of 15 standard round-top humps. Phases 2 and 3 were completed in September 1993 and Summer 1995 respectively and consisted of a further 16 round-top humps and 3 table junctions. Examples of the measures are given in Fig 5.

The parking restrictions on Islingword Road and Southover Street have caused problems which have been reviewed and amended by the authority.

The accident data for Phases 1 and 2 combined is one of only two areas to have shown an increase (3.7 to 6.7 accidents per year). The speed reduction was fairly small - from 23 mph to 17 mph. The accident increase can probably be attributed to the usual variations when accident numbers are small.

Vehicle flows on the roads within the 20 mph zone were reduced on average by 22% whereas the flows on the boundary roads of Elm Grove and Queens Park Road were increased by approximately 4%.

Phase 1 of the scheme cost approximately £72,000 and permanent 20 mph zone status was granted on 18th October 1994. Phases 2 and 3 cost £60,000 and £55,000 respectively.

4.3 CROWTHORNE, HIGH STREET

The Crowthorne, High Street zone (Zone No. 2) is a 440 metres long shopping street, classed as an 'A' class road but downgraded to a 'B' class road when a by-pass was opened in August 1990. A 20 mph zone was then constructed by 27th February 1992. The layout of the High Street, which contains 75 mm high flat-top humps, three of which are pedestrian crossings as shown in Fig 6. The measures used in the High Street are shown in Fig 7.

The scheme had some initial objections particularly from the local traders who were concerned about loss of trade, but the scheme is now working well with reduced accidents (-69%) and average vehicle speeds reduced from 28 mph to 14 mph (DOT, 1990).

Flows were reduced by approximately 32% to 11,500 vehicles per day due to the bypass and the 20 mph zone. The Crowthorne bypass currently carries approximately 15,000 vehicles per day.

The scheme cost approximately £160,000 and permanent 20 mph zone status was granted on 18th May 1993.

4.4 DUDLEY, WRENS NEST ROAD

The Wrens Nest Road zone (Zone No. 47) was installed during February, March and April 1993. It is a single 670 metres long road scheme (see Fig 8) which consists of 5 flat-top tables, each 65 mm high. The ramp gradients are 1:15 with plateaux of approximately 23 metres long with a chicane incorporated. The scheme has reduced average vehicle speeds to about 16 mph (DOT, 1990) and accidents have been reduced from 3 per year to zero.

The scheme cost approximately £132,000 and permanent 20 mph zone status was granted on 22nd November 1994.

4.5 HORSHAM, CARFAX

The Horsham, Carfax zone (Zone No. 14) is a town centre scheme, including a pedestrianised section. The total area is about 0.2 sq.km and the total road length is 1.4 km (see Fig 9). The measures, installed by 30th April 1992, include nineteen speed control humps, ten of which were constructed of light coloured clay pavers, and nine of York stone setts. The materials were chosen so that they blended with the surroundings (See Fig 10). Environmental enhancements such as bollards, litter bins and lighting have also been incorporated. A Traffic Advisory Leaflet has been issued (DOT, 1992) which gives background information and early results from the zone. Accidents have been reduced by 69% and average vehicle speeds have been reduced to approximately 13 mph (DOT, 1990).

The scheme cost approximately £2.3m and permanent status was granted on 30th March 1993. The £2.3m included aesthetic treatment which would not normally be associated with a 20 mph zone.

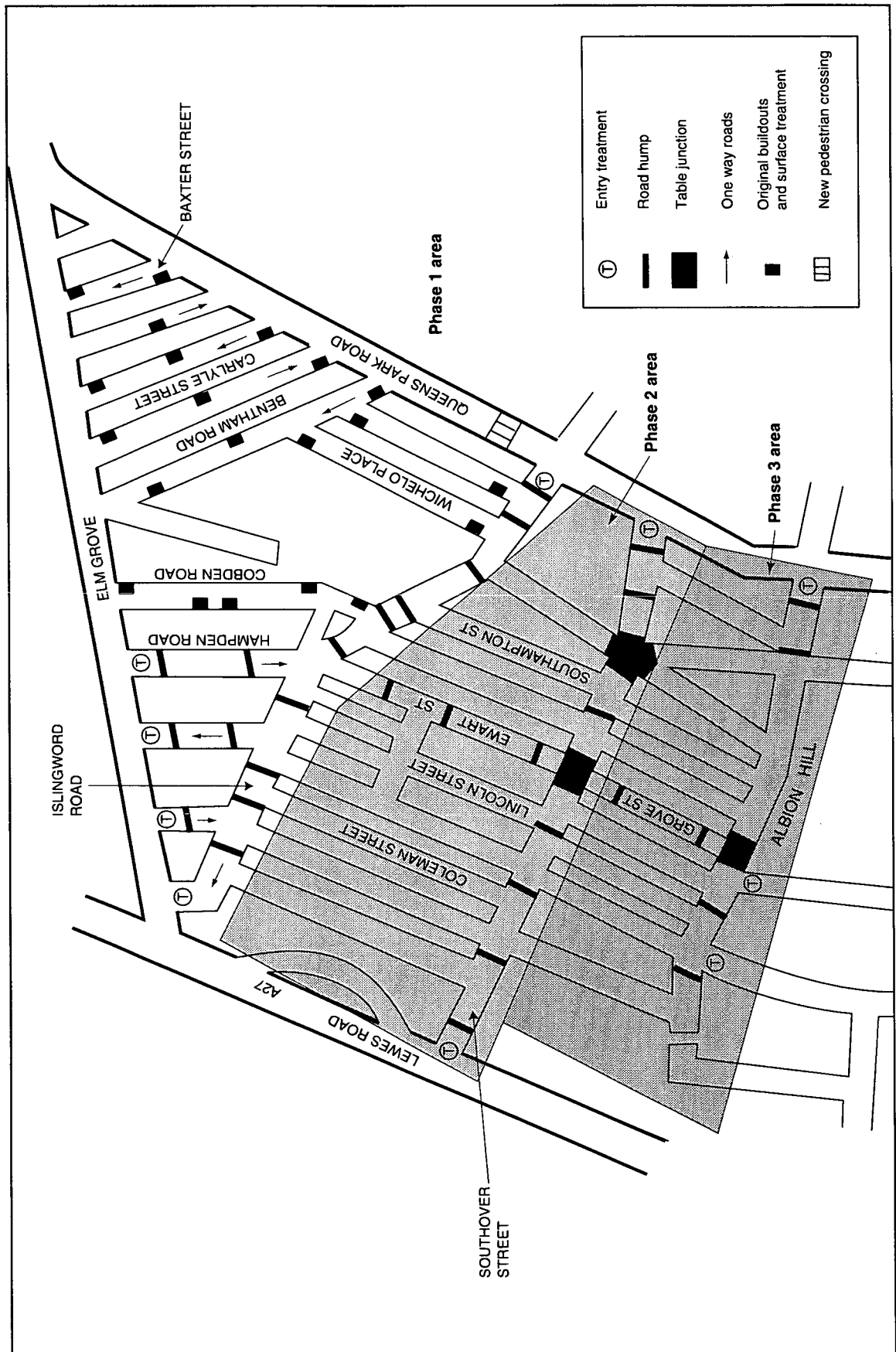


Fig. 4 Plan of phases in Hanover area, Brighton



(a) Baxter Street showing pre 20 zone measures



(b) Southover Street looking west towards raised mini-roundabout

Fig.5 Brighton, Hanover area 20 mph zone



(c) 20 zone entrance to Islingword Road from Queens Park Road



(d) Cycle gate at southern end of Hampden Road

Fig.5 cont. Brighton, Hanover area 20 mph zone

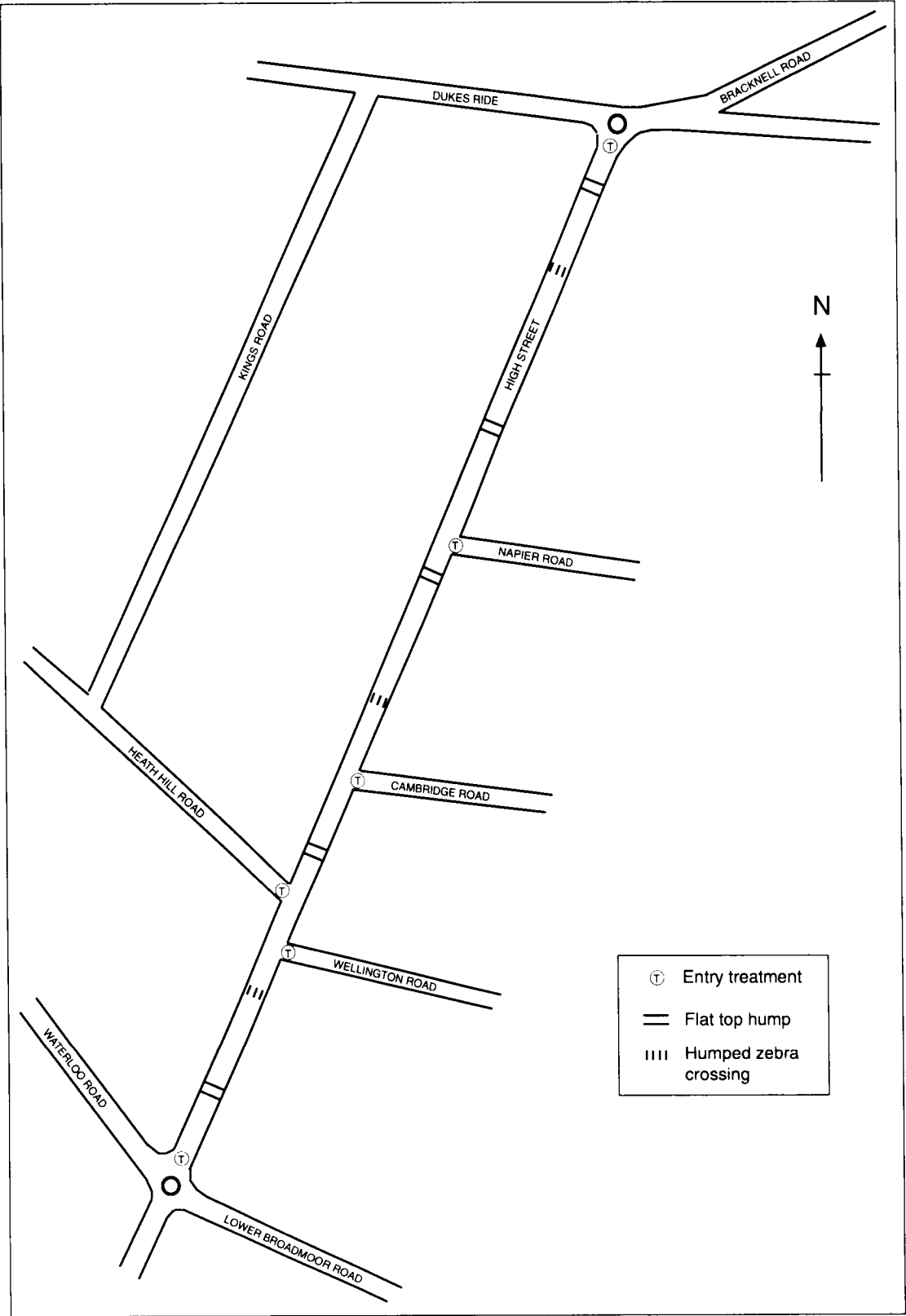


Fig. 6 Plan of Crowthorne High Street



Neg. no. CR372/92/45

(a) Narrowed flat-top hump in the High Street



Neg. no. CR372/92/47

(b) Humped zebra crossings in the High Street

Fig.7 Crowthorne, High Street 20 mph zone



Neg. no. CR314/93/3

(a) Long flat-top hump combined with chicane and narrowing



Neg. no. CR314/93/7

(b) Junction table combined with central refuge

Fig.8 Dudley, Wrens Nest Road 20 mph zone

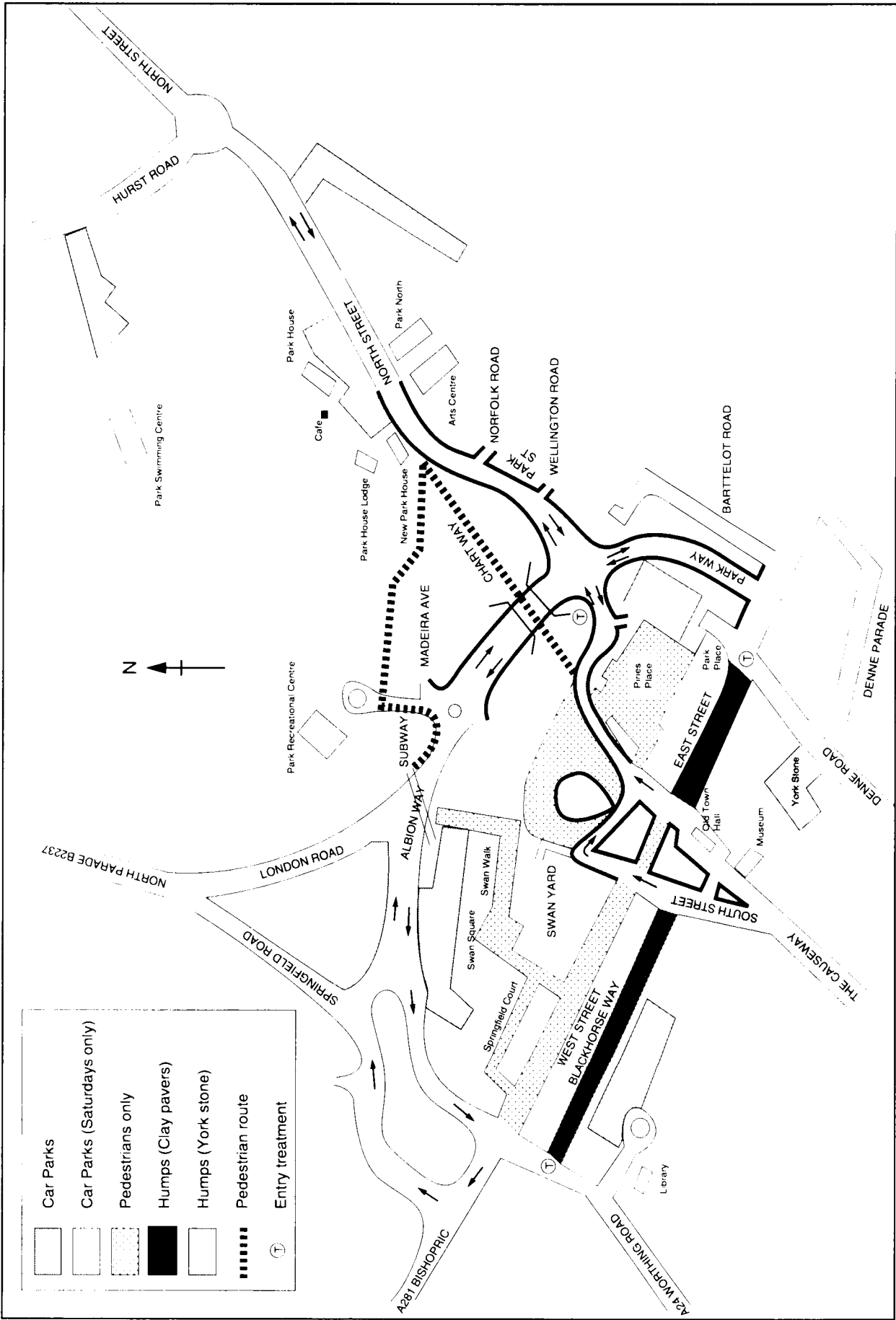


Fig. 9 Plan of Carfax area – Horsham



Neg. no. CR512/95/15

(a) 20 mph zone entry at East Street



Neg. no. CR512/95/16

(b) East Street showing narrowings and parking bays looking west

Fig.10 Horsham, Carfax 20 mph zone



Neg. no. CR512/95/4

(c) Black Horse Way looking east



Neg. no. CR512/95/8

(d) The Causeway looking south towards St Mary's Church

Fig.10 cont. Horsham, Carfax 20 mph zone

4.6 SUTTON, WORCESTER PARK

The Worcester Park zone (Zone No. 73) was originally built in stages between July 1989 and March 1991, as a traffic calming scheme. The Local Authority subsequently applied, and were granted permanent approval on 29th October 1993 for a 20 mph zone, as the speeds were already below 20 mph. The layout of the zone is given in Fig 11. A variety of measures were installed. Narrowings were originally tried on Green Lane, Brinkley Road, St Philips Avenue and Lyndsay Road, but these did not reduce speeds and so 80 mm high road humps were added to the narrowings. The rest of the scheme consists of 100 mm (Figs 12a, 12c & 12d) or 80 mm (Fig 12b) high road humps.

The scheme was successful at reducing accidents before it became a 20 mph zone and has continued to do so since it became a permanent 20 mph zone. A new 'Hoppa' bus service is due to be started in the Worcester Park area and therefore Sutton have obtained approval from DOT to use speed cushions on the bus route, replacing the current road humps, on Green Lane, Caldbeck Avenue, Browning Avenue, Dorchester Road and Langley Avenue.

The scheme cost approximately £200,000 and permanent status was granted on 29th October 1993.



Fig. 11 Plan of Worcester Park – Sutton



Neg. no. CR511/95/11

(a) Washington Road entry to 20 mph zone



Neg. no. CR511/95/7

(b) Green Lane showing original narrowing and subsequent hump

Fig.12 Sutton, Worcester Park 20 mph zone



Neg. no. CR511/95/12

(c) Washington Road showing volume of parking



Neg. no. CR511/95/22

(d) Langley Avenue showing volume of parking

Fig.12 cont. Sutton, Worcester Park 20 mph zone

5. ACCIDENT DATA FOR 72 SCHEMES

Seventy-two of the schemes have been installed for at least 12 months which is sufficiently long to provide an average of 30 months 'after' accident data, so they have been used to assess the safety benefits.

5.1 'BEFORE' ACCIDENTS

At least three years of 'before' injury accident data for the individual zones showed that the annual rate of accident occurrence was about 3.3 injury accidents per year per scheme. As the average road length per scheme was 3.3 km, the annual accident rate was 1.0 accident per year per km.

5.2 COMPARISON OF 'BEFORE' AND 'AFTER' INJURY ACCIDENTS

A comparison of reported injury accident numbers are shown in Table 1.

The average annual accident frequency shows a drop of 61 per cent 'after' the introduction of the 20 mph zones. This reduction in the total number of accidents is statistically significant using Chi-square test ($p < 0.05$) showing that the reduction is unlikely to be due to chance. Pedestrian, pedal cyclist, motor cyclist and other (vehicle only) accident reductions were also significant at the 5% level.

'Regression to the mean' is a possibility that needs to be considered in 'before' and 'after' studies, if what appear to be above average accident sites are treated. It is thought unlikely to be a major problem with 20 mph zones as they have generally not been selected because of a high accident rate. An additional safeguard is the long 'before' period (up to 5 years) that has been used in the study.

5.3 COMPARISON OF 'BEFORE' AND 'AFTER' CHILD CASUALTIES

Table 1 shows the child (age 15 or less) pedestrian and cyclist casualty data. The average annual casualty frequency for this group showed a highly significant drop of 67 per cent. Child pedestrian and child cyclist accidents fell by 70 and 48 per cent respectively. Results for individual schemes are given in more detail in Appendix D. These show that the Small Heath scheme (Scheme No. 20) has been very successful at reducing the accident rate from 10.7 to 3.2 accidents per year. Many schemes have reduced accidents to zero but a few have shown a slight increase which could be due to random fluctuations as the numbers are small.

5.4 SEVERITY OF ACCIDENTS

During the 'before' period there were 8 fatal accidents, giving an overall annual rate of 2.3. During the after period there was one fatal accident (an adult cyclist at Tinsley, Sheffield), an annual rate of 0.4, but these numbers are too small to provide conclusive results on fatal accidents.

The ratio of fatal and serious accidents as a proportion of the total is a more reliable indicator of severity, and for all accidents, showed a reduction from 0.21 'before' to 0.16 'after'.

5.5 ACCIDENTS AT/NEAR JUNCTIONS

A high proportion of accidents often occur at/near junctions because of the conflicts which are inevitable when vehicles turn into or out of a junction. The numbers and proportions of such accidents in the 20 mph zones were analysed for 67 zones and the results are given in Table 2.

TABLE 1

Summary of annual accident data for all sites

	Annual accident rate/scheme		Significant	
	Before	After	Reduction (%)	At 5% level
Pedestrian	1.69	0.62	63	YES
Pedal cyclist	0.42	0.30	29	YES
Motor cyclist	0.40	0.11	73	YES
Others	0.87	0.29	67	YES
Child (Ped)	1.24	0.37	70	YES
Child (P/c)	0.21	0.11	48	YES
Child (all)	1.45	0.48	67	YES
All per site	3.38	1.32	61	YES
All schemes/year	243.4	95.0	61	YES

TABLE 2

Percentage of accidents at/near junctions

	Before(B)			After(A)			Diff (B-A)%
	Junc	Total	% at junc	Junc	Total	% at junc	
Car/Car	92	131	70	21	30	70	0
Car/Ped	134	308	44	42	90	47	3
Car/Pc	61	81	75	29	40	73	-2
Car/Mc	67	78	86	10	13	77	-9
Gds/Ped	22	43	51	6	12	50	-1
Other	61	112	54	23	34	68	14
All	437	753	58	131	219	60	2

Notes. Pc = Pedal-cyclist, Mc = Motorcyclist, Gds = goods vehicles and buses

The results in Table 2 show that there was very little difference overall in the percentage of accidents at/near junctions between the 'before' and 'after' periods.

5.6 ACCIDENT MIGRATION

A possible concern of traffic calming in an area is that traffic and therefore accidents may be redistributed to the neighbouring surrounding area, as drivers choose different routes, so as to avoid the speed reducing measures. This possibility was investigated for 40 of the schemes, see Table 3, where it was thought that driver route changes may have occurred and increased the potential for transfer of accidents.

Table 3 shows the changes in annual injury accident rates 'before' and 'after' the calming measures were installed. This shows that on roads surrounding the 20 mph zones, despite increases in flow at 17 sites, there was an overall accident decrease, of 4 per cent which was not significant at the 5% level. This indicates that the potential problem of accident migration is not typical at 20 mph zones, but that the possibility should be borne in mind when 20 mph zones are being considered by Local Authorities.

6. SPEED REDUCTIONS

Circular Roads 4/90 (Department of Transport, 1990) stipulates that speeds are to be measured at and between measures at representative points within the zone, and that before permanent authorisation can be given, the average of these two sets of speeds must be 20 mph or below.

'After' speed measurements show that the average 'on-measure' speed was 13.2 mph, with a range from 8 to 19 mph, and the average 'between-measure' speed was 17.8 mph, with a range from 14 to 23 mph.

The schemes are therefore effective in ensuring that the 'after' speeds comply with the 20 mph zone regulations.

The local authorities did not need to take speed measurements before the measures were installed but both 'before' and 'after' speed measurements were available for 32 of the zones. Table 4 gives a summary of the speed measurements and the reductions for those 32 sites. The 'after' speeds are means of 'on' and 'between' traffic calming measures, as required in Circular Roads 4/90.

The results in Table 4 show that all of the sites had a reduction in mean speed. The overall average mean speed was reduced by 9 mph from 25 mph to 16 mph.

6.1 SPEED REDUCTIONS AND ACCIDENT RATE CHANGES

For those thirty-two zones for which 'before' speed data was available, it was therefore possible to make a comparison between the changes in average speed and the changes in accidents given in Table 5.

Table 5 shows that in these thirty-two zones, accidents fell by an average of 58 per cent, while average speeds fell by 9.3 mph, indicating a 6.2 per cent reduction in accidents for each 1 mph reduction in mean speed.

This result compares well with that found in a comprehensive TRL study of the relationship between speed and accidents on traffic calmed roads (Stark, 1995). This study suggested that a one mile per hour change in the 85th percentile speed produces a 6-7 per cent change in the number of accidents per year.

The data in Table 5 is quite variable but a regression analysis of Speed change versus Accident change gave a linear relationship of:-

$$\text{Accident change (\%)} = \{-0.60 + (6.1 \times \text{Speed change mph})\}$$

where $r = 0.46$ (see Fig 13).

This relationship was significant at the 1% level.

TABLE 3

Changes in annual accident rates on surrounding roads

Scheme Number	Name	Annual accident rate		
		Before	After	% Change
44	Accrington	10.9	13.1	20
20	Birmingham	62.7	44.1	-30
30	Blackburn	47.3	44.8	- 5
11	Bradford	9.7	7.1	-27
63	Brighton	35.0	44.3	27
50	Bristol	13.0	19.4	49
24	Colchester	41.5	32.7	-21
2	Crowthorne	9.7	7.6	-22
25	Fleet	17.3	14.5	-16
26	Gateshead	5.2	7.8	50
94	Hemel Hempstead	23.7	30.0	27
14	Horsham	12.0	12.6	5
41	Ipswich	18.4	14.2	-23
1	Kingston	15.3	11.6	-24
58	Knowsley	19.3	13.0	-33
7	Liphook	6.3	2.9	-54
16	Maidenhead	10.7	11.3	6
67	Manchester	39.0	32.7	-16
70	Manchester	20.7	15.3	-26
65	Newbury	12.0	12.6	5
10	Norwich	21.7	22.2	2
21	Peterborough	35.0	33.8	- 3
54	Plymouth	21.0	15.7	-25
66	Poole	64.7	66.9	3
5	Preston	28.0	36.2	29
4	Richmond	13.0	12.4	- 5
51	Rushden	16.5	11.2	-32
8	Solihull	6.7	8.1	21
19	Solihull	9.0	5.0	-44
62	Solihull	9.7	5.1	-47
22	South Tonbridge	27.3	25.7	- 6
15	Stepney	80.8	88.0	9
73	Sutton	47.3	54.1	14
42	Walsall	49.9	46.7	- 6
33	Winchester	14.7	18.3	24
96	Wokingham	18.7	27.2	45
23	Wolverhampton	39.8	44.8	13
68	Wolverhampton	6.7	5.2	-22
28	Yeovil	17.4	12.0	-31
17	York	35.3	22.8	-35
TOTAL		992.9	953.0	-4.0%

TABLE 4

Speed changes in the 20 mph zones

Scheme Number	Name	Average speed (mph) *		
		Before	After	Change (mph)
57	Barnsley	20.8	13.5	- 7.3
20	Birmingham	25.0	14.9	- 10.1
104	Birmingham	20.9	16.4	- 4.5
105	Birmingham	21.4	17.0	- 4.4
106	Birmingham	23.2	17.9	- 5.3
36	Brighton	23.0	17.3	- 5.7
2	Crowthorne	28.0	14.1	- 13.9
13	Darlington	25.0	15.2	- 9.8
74	Gillingham	30.0	16.1	- 13.9
81	Grantham	22.9	16.1	- 6.8
114	Hammersmith	28.5	19.6	- 8.9
87	Hednesford	23.5	14.5	- 9.0
41	Ipswich	26.1	14.6	- 11.5
1	Kingston	27.3	16.3	- 11.0
10	Norwich	27.2	19.3	- 7.9
78	Nuneaton	29.5	19.5	- 10.0
21	Peterborough	25.7	15.8	- 9.9
54	Plymouth	22.6	12.8	- 9.8
5	Preston	18.7	18.2	- 0.5
4	Richmond	25.0	16.2	- 8.8
51	Rushden	19.7	14.2	- 5.5
6	Sheffield	24.1	14.3	- 9.8
19	Solihull	23.9	16.3	- 7.6
8	Solihull	27.1	15.8	- 11.3
15	Stepney	25.5	13.5	- 12.0
73	Sutton	29.6	17.1	- 12.5
42	Walsall	27.0	17.3	- 9.7
23	Wolver'pton	21.8	15.8	- 6.0
28	Yeovil	30.5	14.8	- 15.7
17	York	22.9	11.8	- 11.1
91	York	34.0	17.5	- 16.5
92	York	28.0	16.9	- 11.1
Overall		25.2	15.9	- 9.3

* Mean of 'on' and 'between' speeds

As can be seen in chapter 7, there were also traffic flow reductions which are likely to have made a small contribution to the accident reductions.

6.2 SPEED - SPACING RELATIONSHIP

When traffic calming measures, such as speed humps, are installed, the spacing apart of these measures is important in determining the speed at which drivers will decide to travel. Previous work by Baguley (1981), found that the increase in speed for an increase in spacing, for 100 mm round-top humps, was about 8 mph per 100 metres. Webster

(1993) found that for 100 mm high round-top and flat-top humps, the relationship was about 9 mph per 100 metres.

Webster and Layfield (1996) studied the effectiveness of 75 mm humps and it was found that there was very little difference in the effectiveness of 75 mm and 100 mm high humps. This study, which included both 20 mph zones and 30 mph zones, showed a significant trend of increasing speed with increasing spacing of about 9 mph per 100 metres for flat-top humps and 6 mph for round-top humps. The lower increase for round-top humps was offset because the hump crossing speeds were about 3 mph higher.

TABLE 5

Reductions in speeds and accidents.

Scheme Number	Name	Reductions	
		Speeds * (mph)	Accidents %
57	Barnsley	- 7.3	- 52
20	Birmingham	-10.1	- 76
104	Birmingham, Sparkbrook	- 4.5	- 51
105	Birmingham, Washwood Heath	- 4.4	- 81
106	Birmingham, Seven Streets	- 5.3	- 75
36	Brighton	- 5.7	82
2	Crowthorne	-13.9	- 69
13	Darlington	- 9.8	- 78
74	Gillingham	-13.9	- 76
81	Grantham	- 6.8	- 60
114	Hammersmith	- 8.9	-100
87	Hednesford	- 9.0	- 74
41	Ipswich	-11.5	- 82
1	Kingston	-11.0	-100
10	Norwich	- 7.9	- 82
78/120	Nuneaton, Camp Hill area**	-10.0	- 60
21	Peterborough	- 9.9	- 33
54	Plymouth	- 9.8	- 61
5	Preston	- 0.5	115
4	Richmond	- 8.8	-100
51	Rushden	- 5.5	- 37
6	Sheffield	- 9.8	- 19
19	Solihull, Kingshurst	- 7.6	- 61
8	Solihull, Olton South	-11.3	- 38
15	Stepney	-12.0	-100
73	Sutton	-12.5	- 77
42	Walsall	- 9.7	- 50
23	Wolverhampton	- 6.0	- 80
28	Yeovil	-15.7	- 71
17	York, The Groves	-11.1	- 74
91	York, Danebury	-16.5	- 45
92	York, Chapelfields	-11.1	- 84
	Averages	9.3	- 58

* Mean of "on" and "between" speeds

** Includes Stockingford (Zone 120)

Layfield (1994) showed that 1900 mm wide cushions gave speed/spacing relationships which were similar to 100 mm high flat-top humps. These results were based on a few sites and a more robust relationship would be possible when more schemes had been installed.

Despite the variety of measures deployed in 20 mph zones, the 13.2 mph crossing speed is very similar to that found by Webster (1993) in his more comprehensive analysis of the effect of individual designs of measures.

In practise this means that measures need to be about 100 metres apart, or less, in order to satisfy the Department of Transport's 20 mph zone design criteria.

7. TRAFFIC FLOWS

Traffic flows were monitored in a number of the schemes but the data are limited as the Local Authorities were not required to submit flow data as part of the authorisation process. The results for the sites available are given in Table 6. Generally there were reductions in flow when 20 mph zones were introduced, which ranged from 4 to 73 per cent. The larger changes took place when a by-pass was also opened. The slight increase in traffic flow on the surrounding roads was not considered to be a problem as they were able to absorb the small amount of extra traffic.

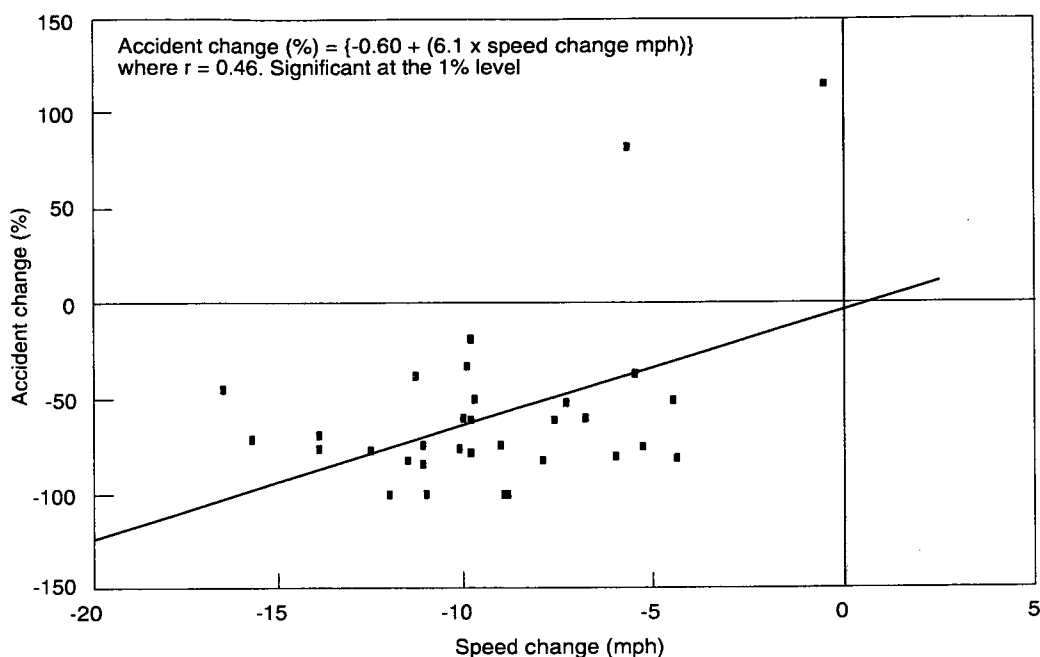


Fig.13 Relationship between speed change and accident change in 20mph zones

TABLE 6

Traffic flow changes at sites in zone and in surrounding area

Scheme Number	Name	change in traffic flow (%)	
		In zone	around zone
130	Berkhamstead	-42	Bypassed**
104	Birmingham (Sparkbrook)	-16	-
105	Birmingham (Washwood Heath)	-20	-
106	Birmingham (Seven Streets)	-23	5
11	Bradford	-15	12
36	Brighton	-22	4
2	Crowthorne	-32	Bypassed
135	Dalton-In-Furness	-71	Bypassed**
12	Exeter	-12	10
74	Gillingham	-60	Bypassed
1	Kingston	-5	-
84	Market Harborough	-41	Bypassed**
21	Peterborough	-20	-
4	Richmond	-5	-
8	Solihull, Olton South	-12	-
73	Sutton	-22	-
89	Whitchurch	-73*	Bypassed**
23	Wolverhampton	-4	23
17	York, The Groves	-12	15
	Overall	-27	12

* Only one-way after zone implemented

** See Bypass Demonstration Project report (DOT, 1995).

The average reduction in flow in the zones was 27 per cent. There was a reduction in flow of 19 per cent, for the zones which had accident data available, and this was compared with the reduction in accidents of approximately 60 per cent for these schemes.

8. PUBLIC ACCEPTABILITY

8.1 CONSULTATION

There are statutory requirements to advertise speed limit orders and to advertise and consult representative organisations before installing road humps. To gain public acceptance of area safety management schemes, including 20 mph zones (DOT, 1991), it is important to involve the local community widely at an early stage so that their concerns and suggestions can be incorporated in the final scheme design. Emergency services vehicles may have particular needs and schemes should take care to avoid the need for them to travel over long stretches of traffic calmed streets. A code of practice for traffic calming schemes has been issued by DOT (1994) which is specifically aimed at the fire and ambulance services. A well designed road hierarchy and appropriate measures for each road are important in achieving a satisfactory compromise between speed reduction and access for residents and road users. Bus operators may also be concerned at slower travel, but there will usually also be a need to slow buses in 20 mph zones, as well as other vehicles.

Discomfort for passengers is another issue and may need less severe measures for bus routes, such as speed cushions, (Layfield, 1994), or longer humps with heights not greater than 75 mm (Webster and Layfield, 1996).

The positioning of speed reducing measures will also need to ensure access for waste disposal and delivery vehicles and to premises with special needs, such as schools, hospitals and businesses is properly catered for.

8.2 REACTION

Surveys amongst residents were carried out in Richmond (Zone No. 4), Sheffield (Zone No. 6), Solihull (Zone No.8) and York (Zone No. 17). A survey in the Town Centre of Hoyland, Barnsley (Zone No. 57) was also carried out.

The survey of residents in Richmond showed that most respondents thought vehicle speeds had been reduced and that the Zone would encourage drivers to take more care. There was overwhelming support for the Zone to be made permanent.

The results from Sheffield indicated that overall reactions to the scheme were generally favourable, with the majority agreeing that the traffic calming created by the 20 mph zone had been of benefit. They identified children in particular,

and pedestrians in general, as the main beneficiaries. There was some concern about damage being caused to vehicles by the speed reducing measures, but this was very much a minority view.

A similar survey carried out in Solihull was generally favourable. It found that most residents felt safer and would recommend traffic calming to other residents in Solihull, but it was noted that there was a slight concern that the humps were too closely spaced.

The results from York were also favourable, showing that vehicle speeds and the volume of traffic were no longer regarded as major problems. Over 75 per cent of respondents strongly supported the 20 mph speed limit.

Barnsley Metropolitan Borough Council commissioned a survey of residents of Hoyland, Barnsley. The results showed that vehicle speeds were lower during the day but they were perceived to be a problem at night, caused by young people driving over the hump ramps at high speed. Over 90% of those interviewed said that they had not reduced the frequency of their trips into the town centre because of the humps.

A survey (Windle and Mackie, 1992) of the residents of Worcester Park, Sutton (Zone No.73) was carried out after the traffic calming measures had been installed. It found that residents felt they had benefited. Almost all of them thought that traffic calming was a good idea, especially when there was a school nearby.

Residents in Nuneaton (Zone No.78) were unhappy with 2 chicanes (in a scheme with 148 other measures). The chicanes caused congestion and were removed by the Local Authority. The scheme has been extremely well accepted by residents since then and there were no objections to the permanent 20 mph zone order.

The scheme in Fenton, Stoke-on-Trent (Zone No.60) was well received by the residents but a minor problem was encountered by certain funeral limousines grounding on the humps approaching Fenton Cemetery. The profiles of the humps were amended to resolve the problem. Grounding of vehicles with low ground clearance can be minimised by using 75 mm high humps (Webster and Layfield, 1996).

Some initial objections, particularly from the local traders, were reported (see 4.3) from the Crowthorne High Street, (Zone No.2) and the Hednesford Town Centre (Zone No.87) schemes. The Local Authorities have reported that the schemes are now generally accepted.

The parking restrictions, (see Fig 5) in Brighton (Zone No.36) on Islingword Road and Southover Street, have caused problems for residents and therefore they have been reviewed and amended by the authority.

9. CONCLUSIONS

The 20 mph zone concept introduced by the Department of Transport has been extremely successful in substantially reducing speeds and accidents in the areas where they have been applied. Over 200 schemes are now installed.

The detailed conclusions from this study are:-

- 1) Injury accidents were reduced by about 60 per cent.
- 2) Child injury accidents were reduced by about 67 per cent.
- 3) Accidents were reduced by 6.2% for each 1 mph reduction in vehicle speed.
- 4) There was no apparent overall accident migration onto surrounding roads.
- 5) Average speeds at the measures were 13.2 mph and the average speed between the measures were 17.4 mph. Overall the speeds were reduced by 9 mph from 25 mph to 16 mph.
- 6) Traffic flows were reduced on average by 27% in the zones, but a large part of the decrease was at a few schemes where by-passes were also built.
- 7) Public reaction to 20 mph zones has been generally favourable with residents feeling safer. Children and pedestrians have been identified as the main beneficiaries.
- 8) The cost of the schemes depended on the size of the area and the type of measures used and so varied enormously with the highest scheme cost being £2.3m. It would appear that about £100,000 to £200,000 is a typical cost of an average scheme.

10. ACKNOWLEDGEMENTS

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APPENDIX A: LIST OF 20MPH SCHEMES AT 11/4/96

STATUS OF 20 MPH ZONES

MAP No.	SCHEME NAME	STATUS	
1	KINGSTON, THE GROVES	PERM ZONE	(7 MAY 92)
2	CROWTHORNE, HIGH STREET	PERM ZONE	(18 MAY 93)
3	LANCASTER, PRIMROSE AREA	PROPOSED	(3 JAN 91)
4	KEW, RICHMOND	PERM ZONE	(2 DEC 92)
5	PRESTON, LOVAT ROAD AREA	PERM ZONE	(11 JUL 95)
6 *	SHEFFIELD, TINSLEY, PHASE 1	PERM ZONE	(30 JUL 92)
6 *	SHEFFIELD, TINSLEY, PHASE 2	PERM ZONE	(11 JUN 93)
6 *	SHEFFIELD, TINSLEY, PHASE 3	PERM ZONE	(7 SEP 93)
6 *	SHEFFIELD, TINSLEY, PHASE 4	PERM ZONE	(6 MAR 95)
7	LIPHOOK, THE AVENUE	PERM ZONE	(18 DEC 92)
8	SOLIHULL, OLTON SOUTH	PERM ZONE	(2 JUL 93)
9	IRONBRIDGE, HIGH STREET	PERM ZONE	(3 AUG 93)
10	NORWICH, EARLHAM NORTH	PERM ZONE	(13 JUN 94)
11	BRADFORD, SCOTCHMAN ROAD	TEMP ZONE	(7 MAY 93)
12	EXETER, BURNTHOUSE LN AREA	TEMP ZONE	(21 FEB 95)
13	DARLINGTON, SKERNE PARK	PERM ZONE	(20 MAR 95)
14	HORSHAM, CARFAX, TOWN CENTRE	PERM ZONE	(30 MAR 93)
15	STEPNEY, ST. MARY'S WARD	PERM ZONE	(7 DEC 93)
16	MAIDENHEAD, RAY MILL ROAD	PERM ZONE	(3 AUG 93)
17	YORK, THE GROVES	PERM ZONE	(7 SEP 93)
18	WELLS, CHARTER WAY	PERM ZONE	(10 DEC 93)
19	SOLIHULL, KINGSBURST	PERM ZONE	(7 SEP 93)
20	BIRMINGHAM, SMALL HEATH	PERM ZONE	(16 JUL 93)
21	PETERBOROUGH, GLADSTONE	PERM ZONE	(6 DEC 93)
22	SOUTH TONBRIDGE, KENT	TEMP ZONE	(2 NOV 95)
23	WOLVERHAMPTON, WHITMORE R.	PERM ZONE	(29 OCT 93)
24	COLCHESTER, NEW TOWN	PERM ZONE	(18 OCT 94)
25	FLEET, GLEN ROAD	TEMP ZONE	(2 MAR 92)
26	GATESHEAD, WREKENTON	PERM ZONE	(20 APR 94)
27 *	SHEFFIELD, NETHER EDGE, PH1	PERM ZONE	(16 JUN 93)
27 *	SHEFFIELD, NETHER EDGE, PH3	PERM ZONE	(24 JAN 95)
28	YEOVIL, STIBY ROAD AREA	TEMP ZONE	(10 MAR 92)
29	CRANLEIGH, SURREY	PROPOSED	(2 MAR 92)
30	BLACKBURN, BROOKHOUSE	PERM ZONE	(5 DEC 94)
31	OXTED, HOLLAND	PROPOSED	(5 MAR 92)
32	LEEDS, QUARRY HILL	PROPOSED	(2 DEC 92)
33	WINCHESTER, UPPER BROOK ST	TEMP ZONE	(9 APR 92)
34	LEWES, MOUNTFIELD ROAD	PERM ZONE	(13 DEC 93)
35	WELLINGTON, SOMERSET	TEMP ZONE	(12 JUN 92)
36 *	BRIGHTON, HANOVER, PHASE 1	PERM ZONE	(18 OCT 94)
36 *	BRIGHTON, HANOVER, PHASE 2	TEMP ZONE	(5 AUG 93)
36 *	BRIGHTON, HANOVER, PHASE 3	TEMP ZONE	(13 APR 95)
37	TROTTISCLIFFE, KENT	PROPOSED	(22 JUL 92)
38	OFFHAM, KENT	PROPOSED	(22 JUL 92)
39	COBHAM, KENT	TEMP ZONE	(28 MAR 96)
40	NORTHFLEET, KENT	PROPOSED	(2 JUN 92)
41	IPSWICH, BRITANNIA AREA	PERM ZONE	(9 MAY 94)
42	WALSALL, CALDMORE AREA	PERM ZONE	(28 FEB 94)

STATUS OF 20 MPH ZONES (cont)

MAP No.	SCHEME NAME	STATUS	
43	WAKEFIELD, CITY CENTRE	PERM ZONE	(10 AUG 94)
44	ACCRINGTON, SCAITCLIFFE	PERM ZONE	(7 AUG 95)
45	LONDON, WATLING ST. EC4	TEMP ZONE	(17 AUG 92)
46	LONDON E17, GREENLEAF AREA	TEMP ZONE	(10 MAR 94)
47	DUDLEY, WRENS NEST ROAD	PERM ZONE	(22 NOV 94)
48	READING, WENSLEY ROAD	PERM ZONE	(12 OCT 94)
49	NORTH MITCHAM, MERTON	TEMP ZONE	(6 SEP 94)
50	BRISTOL, SOUTH MEAD	PERM ZONE	(16 DEC 94)
51	RUSHDEN, NORTHANTS	PERM ZONE	(25 MAY 94)
52	SLINFOLD, THE STREET	TEMP ZONE	(12 JUL 95)
53	BURGESS HILL, SUSSEX	TEMP ZONE	(27 MAR 96)
54	PLYMOUTH, GRASSENDALE AVE	PERM ZONE	(26 SEP 94)
55	NEWCASTLE-UPON-TYNE, HEATON	TEMP ZONE	(23 MAY 94)
56	BARNSTAPLE, FOURCHES EST.	PERM ZONE	(28 NOV 95)
57	HOYLAND, BARNSELY	PERM ZONE	(12 JUN 95)
58	KNOWSLEY, HILLSIDE	PERM ZONE	(1 NOV 94)
59	FRECKLETON, LANCS.	PROPOSED	(2 DEC 92)
60	FENTON, STOKE-ON-TRENT	PERM ZONE	(23 DEC 92)
61	BROMLEY, TOWN CENTRE	PROPOSED	(16 DEC 92)
62	SOLIHULL, OLTON NORTH	PERM ZONE	(27 JAN 93)
63	BRIGHTON, RUGBY ROAD AREA	TEMP ZONE	(12 FEB 93)
64	CHISWICK, CHISWICK MEADOWS	TEMP ZONE	(9 SEP 93)
65	NEWBURY, NORTHBROOK STREET	PERM ZONE	(6 DEC 94)
66	POOLE, UPPER PARKSTONE	TEMP ZONE	(24 FEB 93)
67	MANCHESTER, LONGSIGHT	PERM ZONE	(22 DEC 95)
68	WOLVERHAMPTON, GRAISELEY	PERM ZONE	(20 JUL 95)
69	SOUTHPORT, HIGH PARK AREA	PERM ZONE	(9 JAN 95)
70	MANCHESTER, CRUMPSALL	PERM ZONE	(6 DEC 95)
71	WINCHESTER, PARCHMENT ST.	TEMP ZONE	(15 MAR 93)
72	BATLEY, WILTON ESTATE	PROPOSED	(12 MAR 93)
73	SUTTON, WORCESTER PARK	PERM ZONE	(29 OCT 93)
74	GILLINGHAM, DORSET	PERM ZONE	(16 DEC 94)
75	BEESTON, LEEDS	PERM ZONE	(3 MAR 95)
76	SUNDERLAND, TADCASTER ROAD	TEMP ZONE	(11 JUN 93)
77	ROTHERHAM, EAST DENE AREA	PERM ZONE	(20 OCT 94)
78	NUNEATON, CAMP HILL	PERM ZONE	(1 FEB 95)
79	BURNLEY WOOD AREA, LANCS.	TEMP ZONE	(30 AUG 95)
80	WORKINGTON, FROSTOMS EST.	TEMP ZONE	(12 AUG 93)
81	GRANTHAM, BEEDON PARK	PERM ZONE	(22 JUN 95)
82	DEVIZES, TOWN CENTRE	PERM ZONE	(1 DEC 95)
83	GATESHEAD, OLD FOLD ESTATE	TEMP ZONE	(17 JAN 94)
84	MARKET HARBOUROUGH	TEMP ZONE	(7 SEP 93)
85	NEW HARBOUROUGH	TEMP ZONE	(9 SEP 93)
86	LIMPSFIELD, SURREY	PERM ZONE	(1 SEP 95)
87	HEDNESFORD, STAFFS	PERM ZONE	(29 SEP 95)
88	EDMONTON, MIDDX	TEMP ZONE	(7 SEP 93)
89	WHITCHURCH, SHROPSHIRE	TEMP ZONE	(12 DEC 93)
90	MINEHEAD, SAINSBURY ROAD	TEMP ZONE	(25 OCT 93)
91	YORK, DANEBURY DRIVE	PERM ZONE	(10 JUL 95)
92	YORK, CHAPELFIELDS	PERM ZONE	(6 MAR 95)
93	SUNDERLAND, MALING PARK	TEMP ZONE	(6 DEC 93)
94	HEMEL HEMPSTEAD, CORNERHALL	TEMP ZONE	(1 NOV 93)
95	TIPTON, MOAT FARM	PERM ZONE	(17 JAN 96)
96	WOKINGHAM, OXFORD RD AREA	TEMP ZONE	(9 DEC 93)

STATUS OF 20 MPH ZONES (cont)

MAP No.	SCHEME NAME	STATUS	
97	CAMDEN, ST ANDREWS AREA	PERM ZONE	(12 DEC 95)
98	KINGSTON, TOLWORTH AREA	PERM ZONE	(13 MAR 96)
99	CAMBRIDGE, NORTH ROMSEY	TEMP ZONE	(8 FEB 94)
100	DULWICH, COURT LANE	TEMP ZONE	(1 SEP 94)
101	HACKNEY, BROOKE ROAD AREA	PROPOSED	(8 MAR 94)
102	CANTERBURY, FORDWICH	PERM ZONE	(26 APR 95)
103	GRIMSBY, STH NUNSTHORPE	TEMP ZONE	(11 MAR 94)
104	SPARKBROOK, BIRMINGHAM	PERM ZONE	(22 JAN 96)
105	WASHWOOD HEATH, BIRMINGHAM	PERM ZONE	(22 JAN 96)
106	SEVEN STREETS, BIRMINGHAM	PERM ZONE	(22 JAN 96)
107	SHELTON, STOKE ON TRENT	TEMP ZONE	(24 JUN 94)
108	LEWES, CHAPEL HILL	PERM ZONE	(24 JUN 94)
109	REDHILL, EARLSWOOD SURREY	TEMP ZONE	(29 JUN 94)
110	HERTFORD TOWN CENTRE	TEMP ZONE	(05 JUL 94)
111	NORWICH, MOUSEHOLD AVENUE	PERM ZONE	(15 DEC 95)
112	BATH, REDLAND PARK	TEMP ZONE	(08 JUL 94)
113	LETCHWORTH, TOWN CENTRE	TEMP ZONE	(21 JUL 94)
114	HAMMERSMITH, EMLYN ROAD	PERM ZONE	(02 MAY 95)
115	DONCASTER, HIGHFIELDS	TEMP ZONE	(10 AUG 94)
116	EPPING FOREST, HIGH BEACH	TEMP ZONE	(10 AUG 94)
117	WYMONDHAM TOWN CENTRE	TEMP ZONE	(1 SEP 94)
118	SMETHWICK, MONTAGUE ESTATE	TEMP ZONE	(13 SEP 94)
119	LEATHERHEAD, HIGHLANDS RD	TEMP ZONE	(14 SEP 94)
120	NUNEATON, STOCKINGFORD	PERM ZONE	(20 FEB 96)
121	WEST WALWORTH (SOUTHWARK)	TEMP ZONE	(16 SEP 94)
122	BRISTOL, BARTON HILL	TEMP ZONE	(23 SEP 94)
123	BERKHAMSTEAD, SHRUBLANDS	TEMP ZONE	(16 NOV 94)
124	BANBURY, BRETCH HILL	TEMP ZONE	(15 SEP 94)
125	OLLERTON, NOTTINGHAMSHIRE	TEMP ZONE	(28 SEP 94)
126	ROYSTON, TOWN CENTRE	TEMP ZONE	(28 SEP 94)
127	READING, BATTLE SCHOOL AREA	TEMP ZONE	(11 OCT 94)
128	SOUTHAMPTON, LYON STREET	TEMP ZONE	(11 OCT 94)
129	SOUTH TOTTENHAM, GLADESMORE	TEMP ZONE	(23 JAN 95)
130	BERKHAMSTEAD, HIGH STREET	TEMP ZONE	(05 OCT 94)
131	HILLINGDON, WHITEHORN EST	TEMP ZONE	(24 NOV 94)
132	TIPTON, SHRUBBERY ESTATE	TEMP ZONE	(10 OCT 94)
133	IPSWICH, SHAKESPEARE ROAD	TEMP ZONE	(18 OCT 94)
134	MANCHESTER, HULME	PERM ZONE	(26 OCT 94)
135	DALTON-IN-FURNESS AREA	TEMP ZONE	(24 OCT 94)
136	DONCASTER, EDLINGTON	TEMP ZONE	(19 OCT 94)
137	KING-U-HULL, OLD BILTON GRA	TEMP ZONE	(19 OCT 94)
138	KING-U-HULL, ST JOHNS GROVE	TEMP ZONE	(19 OCT 94)
139	KING-U-HULL, DANES AREA	TEMP ZONE	(14 NOV 94)
140	KING-U-HULL, RYDE ST AREA	TEMP ZONE	(14 NOV 94)
141	KING-U-HULL, MELROSE ST	TEMP ZONE	(14 NOV 94)
142	KING-U-HULL, WALLIKER ST	TEMP ZONE	(19 NOV 94)
143	NEWCASTLE, FAWDON AREA	TEMP ZONE	(6 DEC 94)
144	MAIDENHEAD, BOYN HILL AREA	TEMP ZONE	(13 DEC 94)
145	READING, TOWN CENTRE	TEMP ZONE	(13 DEC 94)
146	WINCHESTER, MIDDLE BROOK ST	TEMP ZONE	(13 DEC 94)
147	TEWKESBURY, PRIORS PARK	TEMP ZONE	(16 DEC 94)
148	IVYBRIDGE, FORE STREET	TEMP ZONE	(16 DEC 94)
149	PLYMOUTH, HOW & LOOE STS.	PERM ZONE	(12 JAN 95)

STATUS OF 20 MPH ZONES (cont)

MAP No.	SCHEME NAME	STATUS	
150	WANDSWORTH, TOOTING	TEMP ZONE	(04 MAY 95)
151	PORCHESTER, WEST STREET	TEMP ZONE	(23 JAN 95)
152	MARHAM (RAF BASE)	TEMP ZONE	(19 JAN 95)
153	BISHOPS STORTFORD (CENTRE)	TEMP ZONE	(20 JAN 95)
154	NEWBURY, WEST FIELDS	TEMP ZONE	(06 FEB 95)
155	ELY, HIGH STREET AREA	TEMP ZONE	(03 FEB 95)
156	TONBRIDGE, DOUGLAS ROAD	TEMP ZONE	(14 FEB 95)
157	NORWICH, VALPHY AV AREA	TEMP ZONE	(15 FEB 95)
158	PIDDINGHOE, VILLAGE ST	PERM ZONE	(01 MAR 95)
159	PORTSMOUTH, HIGHBURY AREA	TEMP ZONE	(07 MAR 95)
160	SIDMOUTH, TOWN CENTRE	TEMP ZONE	(21 FEB 95)
161	EXETER, BEACON HEATH	TEMP ZONE	(21 FEB 95)
162	BARNSTAPLE, BICTON STREET	TEMP ZONE	(21 FEB 95)
163	BARNSTAPLE, CEDAR GROVE	TEMP ZONE	(21 FEB 95)
164	BARNSTAPLE, BRYNSWORTHY PK	TEMP ZONE	(21 FEB 95)
165	BARNSTAPLE, MAPLE GROVE	TEMP ZONE	(21 FEB 95)
166	NORTHAM, GLEBE FIELDS	TEMP ZONE	(21 FEB 95)
167	BIDEFORD, WATER PARK ROAD	TEMP ZONE	(21 FEB 95)
168	BIDEFORD, GATEFIELD ROAD	TEMP ZONE	(21 FEB 95)
169	BIDEFORD, HANSON PARK	TEMP ZONE	(21 FEB 95)
170	BIDEFORD, AYRES CLOSE	TEMP ZONE	(21 FEB 95)
171	BRAUNTON, ASHTON CRESCENT	TEMP ZONE	(21 FEB 95)
172	SOUTH MOULTON, CHURCHILL CR	TEMP ZONE	(21 FEB 95)
173	KING-U-HULL, 6th AVENUE	TEMP ZONE	(21 MAR 95)
174	KING-U-HULL, 21st AVENUE	TEMP ZONE	(21 MAR 95)
175	CRAMLINGTON, MAYFIELD DALE	PERM ZONE	(21 MAR 95)
176	GREAT DRIFFIELD, AREA	TEMP ZONE	(12 APR 95)
177	ROTHERHAM, DALTON PARK	TEMP ZONE	(12 APR 95)
178	STANMORE, BUCKINGHAM ROAD	TEMP ZONE	(22 MAY 95)
179	CHADWELL HEATH, BARKING	TEMP ZONE	(9 MAY 95)
180	NANTWICH, WHITEHOUSE LANE	TEMP ZONE	(29 APR 95)
181	LITTLE SUTTON, PARKLANDS	TEMP ZONE	(31 MAY 95)
182	BARROW-IN-FURNESS, HINDPOOL	TEMP ZONE	(31 MAY 95)
183	LEWES, SOUTHOVER AREA	TEMP ZONE	(5 JUN 95)
184	NORWICH, BEECHENO RD AREA	TEMP ZONE	(6 JUN 95)
185	HEMEL HEMPST'D, TOWN CENTRE	TEMP ZONE	(30 JUN 95)
186	KING-UPON-HULL, MILLDANE	TEMP ZONE	(3 AUG 95)
187	BLYTH, COWPEN QUAY	TEMP ZONE	(1 AUG 95)
188	COXHEATH, HUNTINGTON ROAD	TEMP ZONE	(31 AUG 95)
189	CRAWLEY, BROADFIELD AREA	TEMP ZONE	(8 SEP 95)
190	ETON, TOWN CENTRE	TEMP ZONE	(18 SEP 95)
191	KING-U-HULL, THORPES AREA	TEMP ZONE	(28 SEP 95)
192	MANCHESTER, ESMOND RD AREA	TEMP ZONE	(4 SEP 95)
193	SMETHWICK, EDGBASTON AREA	TEMP ZONE	(9 OCT 95)
194	WOKINGHAM, EMBROOK RD AREA	TEMP ZONE	(11 OCT 95)
195	BROSELEY, HIGH STREET	TEMP ZONE	(16 OCT 95)
196	SMETHWICK, WINDMILL ESTATE	TEMP ZONE	(16 OCT 95)
197	CRAWLEY, ASHDOWN DR. AREA	TEMP ZONE	(18 OCT 95)
198	PORCHESTER, WEST STREET	TEMP ZONE	(23 JAN 95)
199	COXHEATH, HUNTINGTON ROAD	TEMP ZONE	(31 AUG 95)
200	TIPTON, BAKER ST. AREA	TEMP ZONE	(22 NOV 95)
201	TIPTON, TUDOR ST. AREA	TEMP ZONE	(22 NOV 95)
202	CRADLEY HEATH, SOUTHBANK RD	TEMP ZONE	(23 NOV 95)
203	SONNING VILLAGE	TEMP ZONE	(6 DEC 95)

STATUS OF 20 MPH ZONE (cont)

MAP No.	SCHEME NAME	STATUS		
204	RUGBY, CENTRAL AREA	TEMP	ZONE	(10 APR 95)
205	HORSHAM, WORTHING RD AREA	TEMP	ZONE	(27 APR 95)
206	CROWTHORNE, DUKES RIDE	TEMP	ZONE	(15 SEP 95)
207	FRIZINGHALL, BRADFORD	TEMP	ZONE	(29 NOV 95)
208	DENTON, MOORSIDE LANE AREA	PERM	ZONE	(30 NOV 95)
209	DROYLSDEN, HAMPSON ST AREA	PERM	ZONE	(30 NOV 95)
210	SMETHWICK, CHESHIRE RD AREA	TEMP	ZONE	(20 DEC 95)
211	STOKE, SHELTON AREA	TEMP	ZONE	(15 DEC 95)
212	DERBY, PEARTREE AREA	TEMP	ZONE	(17 JAN 96)
213	HULL, KILNSEA GROVE AREA	TEMP	ZONE	(14 JAN 96)
214	HULL, LEE ST/WESTCOTT ST	TEMP	ZONE	(14 JAN 96)
215	HULL, KENILWORTH AV. AREA	TEMP	ZONE	(14 JAN 96)
216	HULL, ESCOURT STREET AREA	TEMP	ZONE	(14 JAN 96)
217	GOBOWEN, SCHOOL LANE	TEMP	ZONE	(17 JAN 96)
218	SANDHURST, YORK WAY	TEMP	ZONE	(2 FEB 96)
219	COOKHAM, THE POUND	TEMP	ZONE	(2 FEB 96)
220	GUILDFORD, BELLFIELD	TEMP	ZONE	(9 FEB 96)
221	THATCHAM, TOWN CENTRE	TEMP	ZONE	(26 FEB 96)
222	KING-U-HULL, BRINDLEY ST	TEMP	ZONE	(19 FEB 96)
223	KING-U-HULL, 1ST AVENUE	TEMP	ZONE	(19 FEB 96)
224	KING-U-HULL, WATTON GROVE	TEMP	ZONE	(19 FEB 96)
225	KING-U-HULL, ALLIANCE AV	TEMP	ZONE	(19 FEB 96)
226	WITHERNSEA, QUEEN ST SOUTH	TEMP	ZONE	(19 FEB 96)
227	HYNDBURN, FIELD BOTTOMS EST	TEMP	ZONE	(29 FEB 96)
228	COVENTRY, HILLFIELDS	TEMP	ZONE	(12 MAR 96)
229	HULL, DE GREY ST AREA	TEMP	ZONE	(7 MAR 96)
230	HULL, JALLAND ST AREA	TEMP	ZONE	(11 MAR 96)
231	HULL, BARNSLEY ST AREA	TEMP	ZONE	(12 MAR 96)
232	HULL, SCALBY GROVE AREA	TEMP	ZONE	(12 MAR 96)
233	RICKMANSWORTH, HIGH STREET	TEMP	ZONE	(14 MAR 96)
234	LAMBETH, BELVEDERE ROAD	TEMP	ZONE	(3 APR 96)
SCOTLAND				
S1	EDINBURGH, NIDDRIE HOUSE	PERM	ZONE	(4 MAR 94)
S2	PERTH, MUIRTON	PERM	ZONE	(31 JAN 96)
S3	GLASGOW, PARTICK	PERM	ZONE	(4 MAR 94)
S4	DUMFRIES, LOCHSIDE ROAD	PERM	ZONE	(31 JAN 96)
S5	GALASHIELS, KINGSKNOWE	TEMP	ZONE	(10 FEB 95)
S6	DUNFERMLINE, EVERSLED DRIVE	PERM	ZONE	(4 DEC 95)
WALES				
W1	RHYL, PRINCES STREET	PERM	ZONE	(25 OCT 93)
W2	WREXHAM, QUEENS PARK	TEMP	ZONE	(21 FEB 95)
W3	NEWPORT, FAIRFAX ROAD	TEMP	ZONE	(3 MAR 94)
W4	BRIDGEND, BRACKLA AREA	TEMP	ZONE	(11 MAY 94)
TOTALS: (ENGLAND ONLY)		PERMANENT	76	
		TEMPORARY	153	
		PROPOSED	11	
			240	(*INCLUDING PHASES)
ALL INCLUDING SCOTLAND & WALES			250	(*INCLUDING PHASES)

APPENDIX B

Before and after accident severity in the 20 mph zones (Data Source - STATS 19)

TRL Scheme no.	Town/ district	Scheme name	Approx before/ after date	Before accidents					Annual freq.	After accidents					Annual freq.
				Months	Slight	Serious	Fatal	Total		Months	Slight	Serious	Fatal	Total	
44	Accrington	Scaitcliffe area	OCT 93	43	15	2	1	18	5.02	21	4	4	0	8	4.57
57	Barnsley	Hoyland	FEB 94	36	5	0	0	5	1.67	15	1	0	0	1	0.80
56	Barnstaple	Forches Estate	FEB 93	36	5	1	0	6	2.00	29	3	0	0	3	1.24
20	Birmingham	Digby, Small Heath	SEP 92	36	43	13	2	58	19.33	34	13	0	0	13	4.59
104	Birmingham	Sparkbrook	JUL 94	60	14	5	0	19	3.80	13	2	0	0	2	1.85
105	Birmingham	Washwood Heath	AUG 94	60	18	8	0	26	5.20	12	1	0	0	1	1.00
106	Birmingham	Seven Streets	JUL 94	60	29	5	0	34	6.80	14	2	0	0	2	1.71
30	Blackburn	Brookhouse	MAY 92	48	12	3	0	15	3.75	37	8	2	0	10	3.24
11	Bradford	Jesmond Avenue	MAY 91	41	6	1	0	7	2.05	49	5	0	0	5	1.22
36	Brighton	Hanover (Phases 1-2)	JAN 94	36	9	2	0	11	3.67	18	8	2	0	10	6.67
63	Brighton	Rugby Road area	AUG 93	36	9	1	0	10	3.33	23	1	0	0	1	0.52
50	Bristol	Southmead	JUN 94	36	7	4	0	11	3.67	13	1	0	0	1	0.92
102	Canterbury	Fordwich	MAY 94	36	2	0	0	2	0.67	12	0	0	0	0	0.00
64	Chiswick	Chiswick Meadows	DEC 93	36	2	1	0	3	1.00	6	0	0	0	0	0.00
24	Colchester	New Town	JLY 92	48	8	1	0	9	2.25	36	0	1	0	1	0.33
2	Crowthorne	High Street	NOV 91	36	8	0	0	8	2.67	44	3	0	0	3	0.82
13	Darlington	Skerne Park	JAN 94	43	10	1	0	11	3.07	18	1	0	0	1	0.67
47	Dudley	Wrens Nest Road	MAY 93	37	5	4	1	10	3.24	26	0	0	0	0	0.00
25	Fleet	Glen Road	MAY 92	52	1	0	0	1	0.23	38	0	0	0	0	0.00
83	Gateshead	Old Fold	MAR 93	24	0	2	0	2	1.00	27	1	0	0	1	0.44
26	Gateshead	Wrekenton	JUN 92	51	12	4	0	16	3.76	37	4	0	0	4	1.30
74	Gillingham, Dorset	Town centre	JUN 93	36	18	0	0	18	6.00	25	3	0	0	3	1.44
81	Grantham	Beeden Park	MAR 94	36	3	2	0	5	1.67	18	1	0	0	1	0.67
114	Hammersmith	Emlyn Road	JAN 94	36	7	0	0	7	2.33	21	0	0	0	0	0.00
87	Hednesford	Town centre	AUG 93	36	6	0	0	6	2.00	23	0	1	0	1	0.52
94	Hemel Hempstead	Cornerhall	JLY 94	36	4	0	0	4	1.33	12	0	0	0	0	0.00
14	Horsham	Carfax	MAY 92	36	6	0	0	6	2.00	38	2	0	0	2	0.63
41	Ipswich	Britannia area	NOV 92	58	9	1	0	10	2.07	32	1	0	0	1	0.38
9	Ironbridge	Ironbridge	FEB 93	61	10	1	1	12	2.36	30	1	0	0	1	0.40
1	Kingston-u-Thames	The Groves	SEP 89	33	2	1	0	3	1.09	54	0	0	0	0	0.00
58	Knowsley	Hillside	JUN 93	36	13	5	0	18	6.00	25	7	2	0	9	4.32
34	Lewes, E Sussex	Mountfield Road	AUG 92	55	4	0	0	4	0.87	35	3	0	0	3	1.03
86	Limpsfield	High Street	JAN 94	36	2	0	0	2	0.67	18	1	1	0	2	1.33
7	Liphook, Hants	The Avenue	JLY 91	42	1	0	0	1	0.29	49	0	0	0	0	0.00
16	Maidenhead	Ray Mill Road area	JUN 92	46	6	1	0	7	1.83	36	0	0	0	0	0.00
70	Manchester	Crumpsall	JAN 94	36	4	3	0	7	2.33	18	0	1	0	1	0.67

Before and after accident severity in the 20 mph zones (cont)

TRL Scheme no.	Town/ district	Scheme name	Approx before/ after date	Before accidents					Annual freq.	After accidents					Annual freq.
				Months	Slight	Serious	Fatal	Total		Months	Slight	Serious	Fatal	Total	
67	Manchester	Longsight	JAN 94	36	32	5	0	37	12.33	18	8	2	0	10	6.67
90	Minehead	Sainsbury Road	FEB 94	36	0	0	0	0	0.00	24	0	0	0	0	0.00
65	Newbury	Northbrook Street	DEC 93	36	19	2	0	21	7.00	19	8	0	0	8	5.05
55	Newcastle	Heaton X streets	APR 93	36	6	1	0	7	2.33	21	0	0	0	0	0.00
10	Norwich	North Earlham	JAN 91	44	17	4	2	23	6.27	54	4	1	0	5	1.11
78	Nuneaton *	Camp Hill	MAY 94	36	17	4	0	21	7.00	13	6	0	0	6	5.54
21	Peterborough	Gladstone area	MAY 92	46	39	15	0	54	14.09	38	24	6	0	30	9.47
54	Plymouth	Grassendale Avenue	MAY 93	36	4	3	0	7	2.33	26	1	1	0	2	0.92
66	Poole	Upper Parkstone	AUG 93	36	17	2	0	19	6.33	14	2	0	0	2	1.71
5	Preston	Lovat Road	MAY 91	36	1	1	0	2	0.67	50	6	0	0	6	1.44
48	Reading	Wensley Road	MAR 93	36	4	1	0	5	1.67	27	4	0	0	4	1.78
4	Richmond	Kew	JAN 90	36	1	0	0	1	0.33	66	0	0	0	0	0.00
51	Rushden	Town centre	DEC 92	59	17	4	0	21	4.27	31	5	2	0	7	2.71
27	Sheffield	Nether Edge (Phase 1)	MAY 92	52	6	3	0	9	2.08	37	1	1	0	2	0.65
6	Sheffield	Tinsley (Phases 1-3)	APR 93	48	10	1	0	11	2.75	27	4	0	1	5	2.22
19	Solihull	Kingshurst	JLY 92	39	6	5	0	11	3.38	36	3	1	0	4	1.33
62	Solihull	North Olton	MAY 93	47	4	1	0	5	1.28	26	0	1	0	1	0.46
8	Solihull	South Olton	MAR 92	50	3	1	0	4	0.96	40	2	0	0	2	0.60
69	Southport	Russell Road area	SEP 93	36	12	3	0	15	5.00	22	1	0	0	1	0.55
22	South Tonbridge	South Tonbridge	JAN 92	48	5	0	0	5	1.25	42	5	0	0	5	1.43
15	Stepney	St. Mary's Ward	APR 92	48	13	4	0	17	4.25	39	0	0	0	0	0.00
60	Stoke-on-Trent	Fenton	DEC 91	36	4	0	0	4	1.33	43	2	0	0	2	0.56
73	Sutton	Worcester Park	OCT 91	48	28	14	0	42	10.50	45	7	2	0	9	2.40
43	Wakefield	Town centre	MAR 93	43	11	5	1	17	4.74	28	6	1	0	7	3.00
42	Walsall	Caldmore area	FEB 93	45	14	2	0	16	4.27	28	5	0	0	5	2.14
35	Wellington	Courtland Road	JUN 92	53	1	0	0	1	0.23	37	0	1	0	1	0.32
18	Wells, Somerset	Charter Way	APR 92	51	2	0	0	2	0.47	39	0	0	0	0	0.00
33	Winchester	Upper Brook Street	JLY 92	54	0	0	0	0	0.00	36	0	0	0	0	0.00
96	Wokingham	Oxford Rd area	APR 94	36	4	0	0	4	1.33	15	0	0	0	0	0.00
68	Wolverhampton	Graisbury	AUG 93	36	5	1	0	6	2.00	23	1	1	0	2	1.04
23	Wolverhampton	Whitmore Reans	JAN 93	60	15	5	0	20	4.00	30	2	0	0	2	0.80
80	Workington	Frostoms Estate	DEC 93	36	1	0	0	1	0.33	24	0	0	0	0	0.00
28	Yeovil	Stiby Road area	MAY 92	51	18	5	0	23	5.41	38	4	1	0	5	1.58
17	York	The Groves	APR 91	39	6	3	0	9	2.77	51	2	1	0	3	0.71
91	York	Danebury Drive	AUG 94	36	12	2	0	14	4.67	14	3	0	0	3	2.57
92	York	Chapelfields	JAN 94	36	7	4	0	11	3.67	21	1	0	0	1	0.57
TOTAL				3047	676	173	8	857	3.38	2098	194	36	1	231	1.32

* Camp Hill (78) and Stockingford (120) combined, currently showing reduction of 60% in accidents after 10.5 months. Warwicks CC data.

APPENDIX C

Before and after accidents by the road user in the 20 mph zones (Data Source - STATS 19)

38

TRL Scheme no.	Town/ district	Scheme name	Before accidents						After accidents								
			Months	Ped	Cyclist	M/cycle	Other	Total	Annual freq.	Months	Ped	Cyclist	M/cycle	Other	Total	Annual freq.	
44	Accrington	Scatcliffe area	43	8	3	2	2	5	18	5.02	21	3	2	1	2	8	4.57
57	Barnsley	Hoyland town centre	36	1	1	0	0	3	5	1.67	15	1	0	0	0	1	0.80
56	Barnstaple	Forches Estate	36	2	3	0	0	1	6	2.00	29	1	0	1	1	3	1.24
20	Birmingham	Digby, Small Heath	36	37	4	2	2	15	58	19.33	34	12	1	0	0	13	4.59
104	Birmingham	Sparkbrook	60	15	0	0	0	4	19	3.80	13	1	0	0	1	2	1.85
105	Birmingham	Washwood Heath	60	21	1	0	0	4	26	5.20	12	1	0	0	0	1	1.00
106	Birmingham	Seven Streets	60	21	0	1	1	12	34	6.80	14	1	0	0	1	2	1.71
30	Blackburn	Brookhouse	48	13	0	1	1	1	15	3.75	37	9	0	0	1	10	3.24
11	Bradford	Jesmond Avenue	41	5	0	1	1	1	7	2.05	49	4	0	0	1	5	1.22
36	Brighton	Hanover (Phases 1-2)	36	2	3	2	2	4	11	3.67	18	4	5	0	1	10	6.67
63	Brighton	Rugby Road area	36	1	1	5	3	3	10	3.33	23	1	0	0	0	1	0.52
50	Bristol	Southmead	36	2	3	1	1	5	11	3.67	13	0	0	0	1	1	0.92
102	Canterbury	Fordwich	36	1	1	0	0	0	2	0.67	12	0	0	0	0	0	0.00
64	Chiswick	Chiswick Meadows	36	1	1	1	1	0	3	1.00	6	0	0	0	0	0	0.00
24	Colchester	New Town	48	3	2	2	2	2	9	2.25	36	1	0	0	0	1	0.33
2	Crowthorne	High Street	36	3	2	3	3	0	8	2.67	44	0	1	1	1	3	0.82
13	Darlington	Skerne Park	43	6	1	2	2	2	11	3.07	18	1	0	0	0	1	0.67
47	Dudley	Wrens Nest Road	37	7	0	1	1	2	10	3.24	26	0	0	0	0	0	0.00
25	Fleet	Glen Road	52	1	0	0	0	0	1	0.23	38	0	0	0	0	0	0.00
83	Gateshead	Old Fold	24	2	0	0	0	0	2	1.00	27	1	0	0	0	1	0.44
26	Gateshead	Wrekenton	51	13	1	0	0	2	16	3.76	37	2	1	0	1	4	1.30
74	Gillingham, Dorset	Town centre	36	7	6	4	4	1	18	6.00	25	0	1	2	0	3	1.44
81	Grantham	Beeden Park	36	5	0	0	0	0	5	1.67	18	0	1	0	0	1	0.67
114	Hammersmith	Emlyn Road	36	2	0	1	1	4	7	2.33	21	0	0	0	0	0	0.00
87	Hednesford	Town centre	36	3	1	0	0	2	6	2.00	23	1	0	0	0	1	0.52
94	Hemel Hempstead	Cornerhall	36	2	2	0	0	0	4	1.33	12	0	0	0	0	0	0.00
14	Horsham	Carfax	36	5	1	0	0	0	6	2.00	38	1	0	0	1	2	0.63
41	Ipswich	Britannia area	58	1	4	4	4	1	10	2.07	32	1	0	0	0	1	0.38
9	Ironbridge	Ironbridge	61	7	0	3	3	2	12	2.36	30	0	1	0	0	1	0.40
1	Kingston-u-Thames	The Groves	33	2	0	0	0	1	3	1.09	54	0	0	0	0	0	0.00
58	Knowsley	Hillside	36	13	1	0	0	4	18	6.00	25	4	1	1	3	9	4.32
34	Lewes, E Sussex	Mountfield Road	55	3	0	0	0	1	4	0.87	35	3	0	0	0	3	1.03
86	Limpfield	High Street	36	1	0	0	0	1	2	0.67	18	0	0	0	0	2	1.33
7	Liphook, Hants	The Avenue	42	0	1	0	0	0	1	0.29	49	0	0	0	0	0	0.00
16	Maidenhead	Ray Mill Road area	46	2	1	4	4	0	7	1.83	36	0	0	0	0	0	0.00
70	Manchester	Crumpsall	36	5	1	0	0	1	7	2.33	18	1	0	0	0	1	0.67

Before and after accidents by the road user in the 20 mph zones (cont)

TRL Scheme no.	Town/ district	Scheme name	Before accidents						After accidents										
			Months	Ped	Cyclist	M/cycle	Other	Total	Annual freq.	Months	Ped	Cyclist	M/cycle	Other	Total	Annual freq.			
67	Manchester	Longsight	36	22	1	0	14	37	12.33	18	4	4	0	2	10	6.67			
90	Minehead	Sainsbury Road	36	0	0	0	0	0	0.00	24	0	0	0	0	0	0.00			
65	Newbury	Northbrook Street	36	14	4	1	2	21	7.00	19	6	1	0	1	8	5.05			
55	Newcastle	Heaton X Roads	36	2	1	1	3	7	2.33	21	0	0	0	0	0	0.00			
10	Norwich	North Earlham	44	11	7	4	1	23	6.27	54	1	2	1	1	5	1.11			
78	Nuneaton	Camp Hill	36	6	7	4	4	21	7.00	13	1	0	2	3	6	5.54			
21	Peterborough	Gladstone area	46	25	17	3	9	54	14.09	38	10	8	2	10	30	9.47			
54	Plymouth	Grassendale Avenue	36	5	0	0	2	7	2.33	26	1	1	0	0	2	0.92			
66	Poole	Upper Parkstone	36	5	2	2	10	19	6.33	14	0	2	0	0	2	1.71			
5	Preston	Lovat Road	36	2	0	0	0	2	0.67	50	3	2	0	1	6	1.44			
48	Reading	Wensley Road	36	4	0	1	0	5	1.67	27	0	2	0	2	4	1.78			
4	Richmond	Kew	36	0	0	1	0	1	0.33	66	0	0	0	0	0	0.00			
51	Rushden	Town centre	59	10	1	8	2	21	4.27	31	6	0	1	0	7	2.71			
27	Sheffield	Nether Edge (Phase 1)	52	7	0	1	1	9	2.08	37	1	0	0	1	2	0.65			
6	Sheffield	Tinsley (Phases 1-3)	48	8	0	0	3	11	2.75	27	2	1	0	2	5	2.22			
19	Solihull	Kingshurst	39	7	1	0	3	11	3.38	36	1	1	0	2	4	1.33			
62	Solihull	North Olton	47	2	0	0	3	5	1.28	26	1	0	0	0	1	0.46			
8	Solihull	South Olton	50	1	0	0	3	4	0.96	40	0	2	0	0	2	0.60			
69	Southport	Russell Road area	36	2	1	3	9	15	5.00	22	0	1	0	0	1	0.55			
22	South Tonbridge	South Tonbridge	48	2	0	1	2	5	1.25	42	1	0	1	3	5	1.43			
15	Stepney	St. Mary's Ward	48	12	0	1	4	17	4.25	39	0	0	0	0	0	0.00			
60	Stoke-on-Trent	Fenton	36	1	1	1	1	4	1.33	43	0	2	0	0	2	0.56			
73	Sutton	Worcester Park	48	8	4	10	20	42	10.50	45	3	2	2	2	9	2.40			
43	Wakefield	Town centre	43	9	0	0	8	17	4.74	28	4	0	0	3	7	3.00			
42	Walsall	Caldmore area	45	5	1	5	5	16	4.27	28	4	0	0	1	5	2.14			
35	Wellington	Courtland Road	53	0	0	0	1	1	0.23	37	0	1	0	0	1	0.32			
18	Wells, Somerset	Charter Way	51	0	1	0	1	2	0.47	39	0	0	0	0	0	0.00			
33	Winchester	Upper Brook Street	54	0	0	0	0	0	0.00	36	0	0	0	0	0	0.00			
96	Wokingham	Oxford Rd area	36	2	1	0	1	4	1.33	15	0	0	0	0	0	0.00			
68	Wolverhampton	Graisley	36	3	0	0	3	6	2.00	23	1	0	1	0	2	1.04			
23	Wolverhampton	Whitmore Reans	60	14	1	0	5	20	4.00	30	1	1	0	0	2	0.80			
80	Workington	Frostoms Estate	36	0	1	0	0	1	0.33	24	0	0	0	0	0	0.00			
28	Yeovil	Stiby Road area	51	9	2	6	6	23	5.41	38	0	4	1	0	5	1.58			
17	York	The Groves	39	2	1	2	4	9	2.77	51	2	0	1	0	3	0.71			
91	York	Danebury Drive	36	2	6	2	4	14	4.67	14	1	1	1	0	3	2.57			
92	York	Chapelfields	36	5	0	4	2	11	3.67	21	0	1	0	0	1	0.57			
			3047	430	106	101	220	857	3.38	2098	108	53	19	51	231	1.32			
ANNUAL FREQ			1.69	0.42	0.40	0.87										0.62	0.30	0.11	0.29

APPENDIX D

Before and after child pedestrian and cyclist accidents in the 20 mph zones (Data Source - STATS 19)

TRL Scheme no.	Town/ district	Scheme name	Approx before/ after date	Before accidents					Annual freq.	After accidents					Annual freq.
				Months	Slight	Serious	Fatal	Total		Months	Slight	Serious	Fatal	Total	
44	Accrington	Scatcliffe area	OCT 93	43	8	1	0	9	2.51	21	1	2	0	3	1.71
57	Barnsley	Hoyland	FEB 94	36	0	0	0	0	0.00	15	0	0	0	0	0.00
56	Barnstaple	Forches Estate	FEB 93	36	1	1	0	2	0.67	29	1	0	0	1	0.41
20	Birmingham	Digby, Small Heath	SEP 92	36	24	8	0	32	10.67	34	9	0	0	9	3.18
104	Birmingham	Sparkbrook	JUL 94	60	9	4	0	13	2.60	13	0	0	0	0	0.00
105	Birmingham	Washwood Heath	AUG 94	60	14	7	0	21	4.20	12	1	0	0	1	1.00
106	Birmingham	Seven Streets	JUL 94	60	13	3	0	16	3.20	14	1	0	0	1	0.86
30	Blackburn	Brookhouse	MAY 92	48	10	2	0	12	3.00	37	6	2	0	8	2.59
11	Bradford	Jesmond Avenue	MAY 91	41	4	1	0	5	1.46	49	3	0	0	3	0.73
36	Brighton	Hanover (Phases 1-2)	JAN 94	36	2	0	0	2	0.67	18	0	0	0	0	0.00
63	Brighton	Rugby Road area	AUG 93	36	2	0	0	2	0.67	23	0	0	0	0	0.00
50	Bristol	Southmead	JUN 94	36	4	1	0	5	1.67	13	0	0	0	0	0.00
102	Canterbury	Fordwich	MAY 94	36	2	0	0	2	0.67	12	0	0	0	0	0.00
64	Chiswick	Chiswick Meadows	DEC 93	36	0	1	0	1	0.33	6	0	0	0	0	0.00
24	Colchester	New Town	JLY 92	48	2	0	0	2	0.50	36	0	1	0	1	0.33
2	Crowthorne	High Street	NOV 91	36	1	0	0	1	0.33	44	0	0	0	0	0.00
13	Darlington	Skerne Park	JAN 94	43	6	1	0	7	1.95	18	0	0	0	0	0.00
47	Dudley	Wrens Nest Road	MAY 93	37	1	1	0	2	0.65	26	0	0	0	0	0.00
25	Fleet	Glen Road	MAY 92	52	1	0	0	1	0.23	38	0	0	0	0	0.00
83	Gateshead	Old Fold	MAR 93	24	0	1	0	1	0.50	27	1	0	0	1	0.44
26	Gateshead	Wrekenton	JUN 92	51	10	3	0	13	3.06	37	2	0	0	2	0.65
74	Gillingham, Dorset	Town centre	JUN 93	36	4	0	0	4	1.33	25	0	0	0	0	0.00
81	Grantham	Beeden Park	MAR 94	36	3	2	0	5	1.67	18	1	0	0	1	0.67
114	Hammersmith	Emlyn Road	JAN 94	36	0	0	0	0	0.00	21	0	0	0	0	0.00
87	Hednesford	Town centre	AUG 93	36	1	0	0	1	0.33	23	0	1	0	1	0.52
94	Hemel Hempstead	Cornerhall	JLY 94	36	4	0	0	4	1.33	12	0	0	0	0	0.00
14	Horsham	Carfax	MAY 92	36	1	0	0	1	0.33	38	0	0	0	0	0.00
41	Ipswich	Britannia area	NOV 92	58	2	0	0	2	0.41	32	0	0	0	0	0.00
9	Ironbridge	Ironbridge	FEB 93	61	2	0	0	2	0.39	30	0	0	0	0	0.00
1	Kingston-u-Thames	The Groves	SEP 89	33	1	0	0	1	0.36	54	0	0	0	0	0.00
58	Knowsley	Hillside	JUN 93	36	9	4	0	13	4.33	25	4	0	0	4	1.92
34	Lewes, E Sussex	Mountfield Road	AUG 92	55	2	0	0	2	0.44	35	2	0	0	2	0.69
86	Limpfield	High Street	JAN 94	36	0	0	0	0	0.00	18	0	0	0	0	0.00
7	Liphook, Hants	The Avenue	JLY 91	42	1	0	0	1	0.29	49	0	0	0	0	0.00
16	Maidenhead	Ray Mill Road area	JUN 92	46	1	0	0	1	0.26	36	0	0	0	0	0.00
70	Manchester	Crumpsall	JAN 94	36	3	2	0	5	1.67	18	0	0	0	0	0.00

Before and after pedestrian and cyclist accidents in the 20 mph zones (cont)

TRL Scheme no.	Town/ district	Scheme name	Approx before/ after date	Before accidents					After accidents						
				Months	Slight	Serious	Fatal	Total	Annual freq.	Months	Slight	Serious	Fatal	Total	Annual freq.
67	Manchester	Longsight	JAN 94	36	15	5	0	20	6.67	18	5	2	0	7	4.67
90	Minehead	Sainsbury Road	FEB 94	36	0	0	0	0	0.00	24	0	0	0	0	0.00
65	Newbury	Northbrook Street	DEC 93	36	3	0	0	3	1.00	19	1	0	0	1	0.63
55	Newcastle	Heaton X Roads	APR 93	36	2	0	0	2	0.67	21	0	0	0	0	0.00
10	Norwich	North Earlam	JAN 91	44	8	5	1	14	3.82	54	2	0	0	2	0.44
78	Nuneaton	Camp Hill	MAY 94	36	8	2	0	10	3.33	13	0	0	0	0	0.00
21	Peterborough	Gladstone area	MAY 92	46	21	10	0	31	8.09	38	5	0	0	5	1.58
54	Plymouth	Grassendale Avenue	MAY 93	36	3	2	0	5	1.67	26	0	1	0	1	0.46
66	Poole	Upper Parkstone	AUG 93	36	5	0	0	5	1.67	14	1	0	0	1	0.86
5	Preston	Lovat Road	MAY 91	36	1	1	0	2	0.67	50	3	0	0	3	0.72
48	Reading	Wensley Road	MAR 93	36	3	1	0	4	1.33	27	1	0	0	1	0.44
4	Richmond	Kew	JAN 90	36	0	0	0	0	0.00	66	0	0	0	0	0.00
51	Rushden	Town centre	DEC 92	59	4	1	0	5	1.02	31	0	1	0	1	0.39
27	Sheffield	Nether Edge (Phase 1)	MAY 92	52	3	3	0	6	1.38	37	0	1	0	1	0.32
6	Sheffield	Tinsley (Phases 1-3)	APR 93	48	4	1	0	5	1.25	27	2	0	0	2	0.89
19	Solihull	Kingshurst	JLY 92	39	4	4	0	8	2.46	36	2	0	0	2	0.67
62	Solihull	North Olton	MAY 93	47	2	0	0	2	0.51	26	0	1	0	1	0.46
8	Solihull	South Olton	MAR 92	50	1	0	0	1	0.24	40	1	0	0	1	0.30
69	Southport	Russell Road area	SEP 93	36	1	0	0	1	0.33	22	1	0	0	1	0.55
22	South Tonbridge	South Tonbridge	JAN 92	48	1	0	0	1	0.25	42	1	0	0	1	0.29
15	Stepney	St. Mary's Ward	APR 92	48	6	2	0	8	2.00	39	0	0	0	0	0.00
60	Stoke-on-Trent	Fenton	DEC 91	36	2	0	0	2	0.67	43	1	0	0	1	0.28
73	Sutton	Worcester Park	OCT 91	48	3	6	0	9	2.25	45	2	1	0	3	0.80
43	Wakefield	Town centre	MAR 93	43	2	0	0	2	0.56	28	1	1	0	2	0.86
42	Walsall	Caldmore area	FEB 93	45	2	0	0	2	0.53	28	2	0	0	2	0.86
35	Wellington	Courtland Road	JUN 92	53	0	0	0	0	0.00	37	0	0	0	0	0.00
18	Wells, Somerset	Charter Way	APR 92	51	1	0	0	1	0.24	39	0	0	0	0	0.00
33	Winchester	Upper Brook Street	JLY 92	54	0	0	0	0	0.00	36	0	0	0	0	0.00
96	Wokingham	Oxford Rd area	APR 94	36	3	0	0	3	1.00	15	0	0	0	0	0.00
68	Wolverhampton	Graisle	AUG 93	36	1	0	0	1	0.33	23	1	0	0	1	0.52
23	Wolverhampton	Whitmore Reans	JAN 93	60	8	3	0	11	2.20	30	1	0	0	1	0.40
80	Workington	Frostoms estate	DEC 93	36	1	0	0	1	0.33	24	0	0	0	0	0.00
28	Yeovil	Stiby Road area	MAY 92	51	7	0	0	7	1.65	38	3	1	0	4	1.26
17	York	The Groves	APR 91	39	1	0	0	1	0.31	51	0	0	0	0	0.00
91	York	Danebury Drive	AUG 94	36	1	0	0	1	0.33	14	1	0	0	1	0.86
92	York	Chapelfields	JAN 94	36	4	0	0	4	1.33	21	0	0	0	0	0.00
TOTAL				3047	279	89	1	369	1.45	2098	69	15	0	84	0.48

MORE INFORMATION

The Transport Research Laboratory has published the following other reports on this area of research:

- PR58 Speed, speed limits and accidents, (1994), D J Finch et al. Price code E
- PR102 Speed control using chicanes - a trial at TRL, (1994), Ivan A Sayer & David I Parry, Price code F
- TRL182 Traffic calming - Four schemes on distributor roads, (1995), David C Webster, Price code E
- TRL186 Traffic calming - Road hump schemes using 75 mm high humps (1996), David C Webster & Roger E Layfield, Price code H

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