CHAPTER 4

CASE STUDIES

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Southall, London
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INTRODUCTION

Individual examples of additions and improvements to residential roads have been chosen from urban areas in England, to demonstrate the range of implementation methods and design solutions adopted. For comparison, some European schemes are also discussed, but it must be appreciated that the full extent and variety of European experience in this field goes far beyond the scope of this paper.

Of the examples from this country, the first four schemes were undertaken primarily with a view to improving pedestrian safety, and include examples of speed control humps (Oxford), road narrowing (Norwich), rumble strips (Bradford), and a rather unusual chicane (Southall). The fifth example deals with the Urban Road Safety Project, which differs from the others in that it is the product of central rather than local government initiative, and also includes main traffic routes as well as residential roads. The last four English examples (from Sheffield, Derby, Rochdale and Leicester) were undertaken primarily for environmental reasons as part of area improvement schemes as follows:

Sheffield (Broomhall)	- Housing Action Area
Derby (Lynton Street)	- General Improvement Area
Rochdale (Deeplish)	- Prototype GIA
Leicester (Worthington St)	- Urban Programme

Although to some extent road safety was an objective of the environmental schemes, the work was funded from sources allocated primarily to meet housing or environmental objectives. The approach to street adaptation has therefore tended to be focussed on either road safety or environment, the particular emphasis depending on the source of initiative and funding, ie. road safety if initiated by the highways section; environment if initiated within the town planning or housing section of the local authority.

The case studies were chosen either because they were local examples of the main trends in residential road adaptations (eg. Derby and Sheffield-Broomhall), or because they were more unusual examples of innovative practice (eg Leicester and Bradford).

SOUTHALL, LONDON

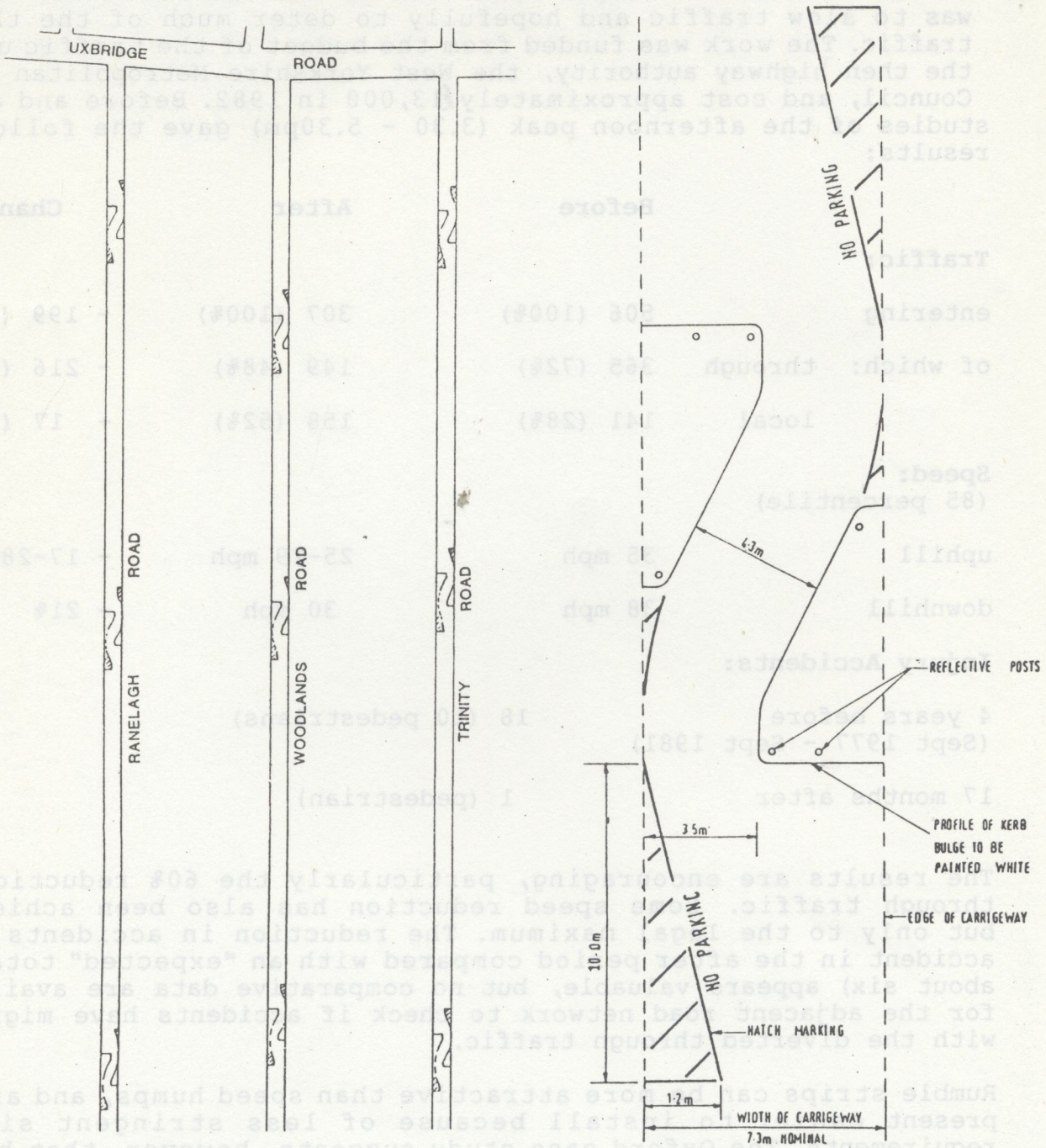
In response to a bad child pedestrian accident rate on typical by-law residential streets in Southall, the local authority - London Borough of Ealing - in conjunction with the Greater London Council placed what they called "footway bulges" on the carriageways of the afflicted residential roads (Figure 8). These unusual additions to a residential road were designed to provide a crossing refuge for pedestrians, where they could cross the road without being masked by parked cars, and to reduce vehicle speed. Pedestrians involved in accidents due to being masked by parked vehicles formed 69% 0f all pedestrian accidents on these streets.

There has since been an apparent improvement in the accident rate:

	All accidents
5 years before (1975-9)	55
Year of implementation (1980)	--
5 years after (1981-5)	28
Apparent reduction	49%

Pedestrian accidents showed a greater reduction of 59% for the three years after compared to three years before the scheme (Source L. B. Ealing). Vehicle speeds have also been reduced, for the footway bulges require a sharp turn from vehicles negotiating them. As a crossing aid for pedestrians the bulges are useful in that they leave a place cleared of parked cars for approximately 20 metres, but their wide spacing (about 120 metres) means that pedestrians are unlikely always to use them. The main benefit for pedestrians crossing therefore seems to be the speed reductions brought about by the chicanes. Little attempt has been made to make these features aesthetically pleasing, for example the surface used is different from the original footway paving, and the streets still have the appearance of having a predominantly highway function. But the measures do appear to have reduced vehicle speeds to within the 30 mph limit, and there is less danger of pedestrians being masked by parked cars.

FIGURE 12: Plan of "footway bulge" and its application in Southall, West London.



FAIRBANKS ROAD, BRADFORD

In response to residents' calls for action against speeding through traffic on this long, straight inner-city residential road, a series of "rumble strips" were laid in the road surface. The aim was to slow traffic and hopefully to deter much of the through traffic. The work was funded from the budget of the traffic unit of the then highway authority, the West Yorkshire Metropolitan County Council, and cost approximately £13,000 in 1982. Before and after studies of the afternoon peak (3.30 - 5.30pm) gave the following results:

		Before	After	Change
Traffic:				
entering		506 (100%)	307 (100%)	- 199 (39%)
of which:	through	365 (72%)	149 (48%)	- 216 (59%)
	local	141 (28%)	158 (52%)	+ 17 (12%)
Speed: (85 percentile)				
uphill		35 mph	25-29 mph	- 17-28%
downhill		38 mph	30 mph	- 21%

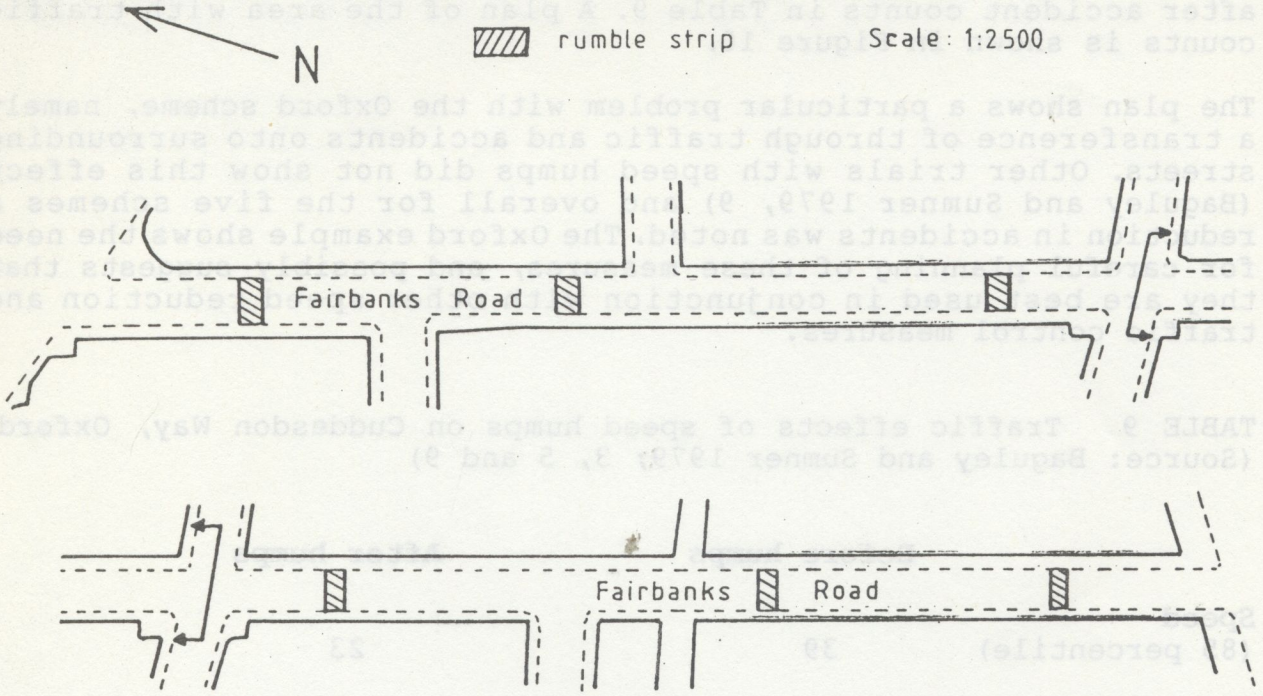
Injury Accidents:

4 years before (Sept 1977 - Sept 1981)	18 (10 pedestrians)
17 months after	1 (pedestrian)

The results are encouraging, particularly the 60% reduction of through traffic. Some speed reduction has also been achieved, but only to the legal maximum. The reduction in accidents (one accident in the after period compared with an "expected" total of about six) appears valuable, but no comparative data are available for the adjacent road network to check if accidents have migrated with the diverted through traffic.

Rumble strips can be more attractive than speed humps, and are at present easier to install because of less stringent siting requirements. The Oxford case study suggests, however, that humps are more effective in reducing speeds.

FIGURE 9: Siting of rumble strips on Fairbanks Road, Bradford.



CUDDESDON WAY, OXFORD

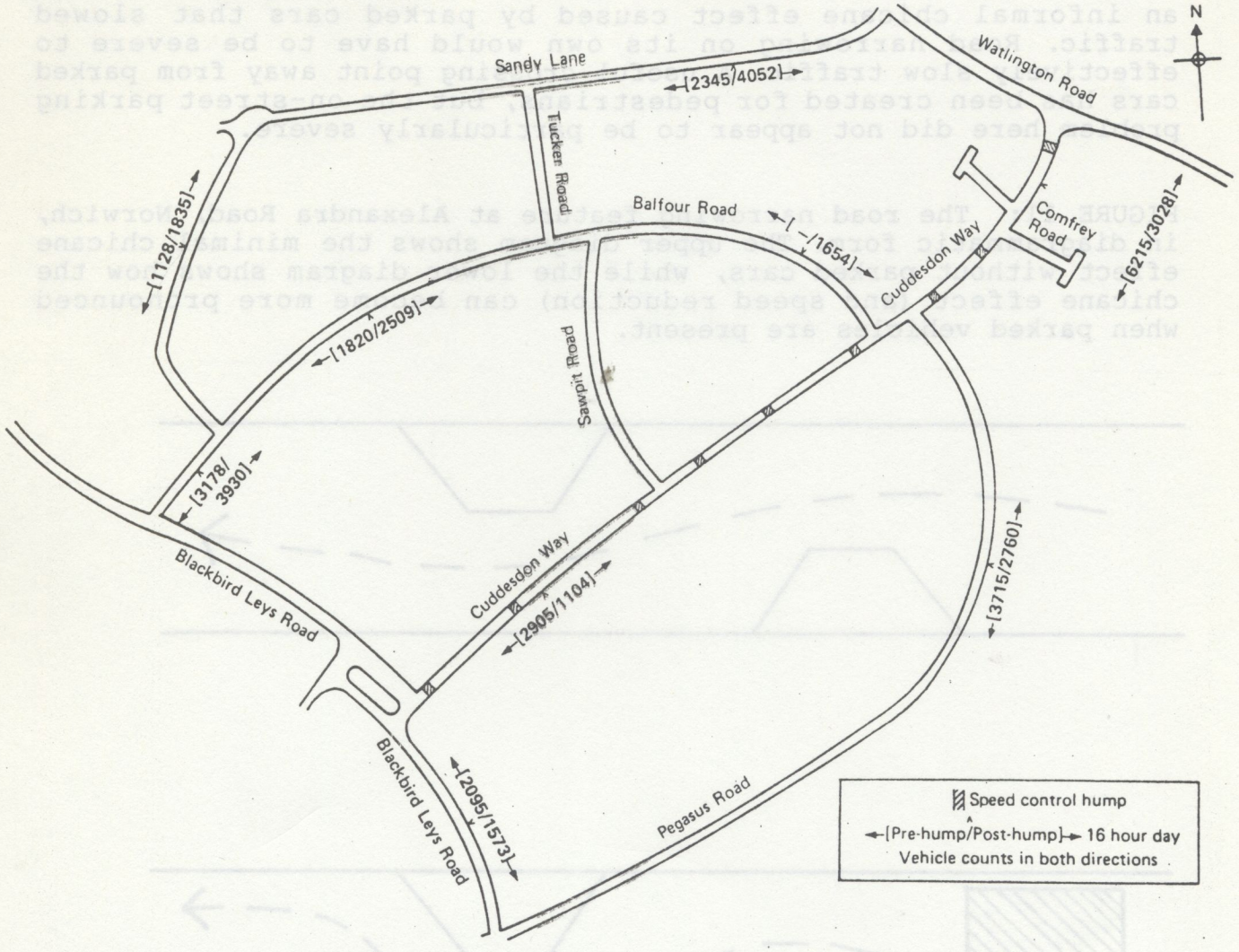
Cuddesdon Way was chosen by the Transport and Road Research Laboratory for one of five speed hump trial schemes. The road is residential, serving modern local authority housing. The speed reduction effect of the humps is given, together with before and after accident counts in Table 9. A plan of the area with traffic counts is shown in Figure 10.

The plan shows a particular problem with the Oxford scheme, namely a transference of through traffic and accidents onto surrounding streets. Other trials with speed humps did not show this effect (Baguley and Sumner 1979, 9) and overall for the five schemes a reduction in accidents was noted. The Oxford example shows the need for careful planning of these measures, and possibly suggests that they are best used in conjunction with other speed reduction and traffic control measures.

TABLE 9 Traffic effects of speed humps on Cuddesdon Way, Oxford. (Source: Baguley and Sumner 1979; 3, 5 and 9)

	Before humps		After humps
Speed (85 percentile)	39		23
Vehicle flow (16 hour, two way)	2,905	western end	1,104
	6,215	eastern end	3,028
Accidents Cuddesdon Way, injuries/year	9.4	(expected without humps)	1
Surrounding roads	20.3	"	34

FIGURE 10: Plan showing Cuddesdon Way, Oxford, and surrounding streets (source Baguley and Sumner, 1979).

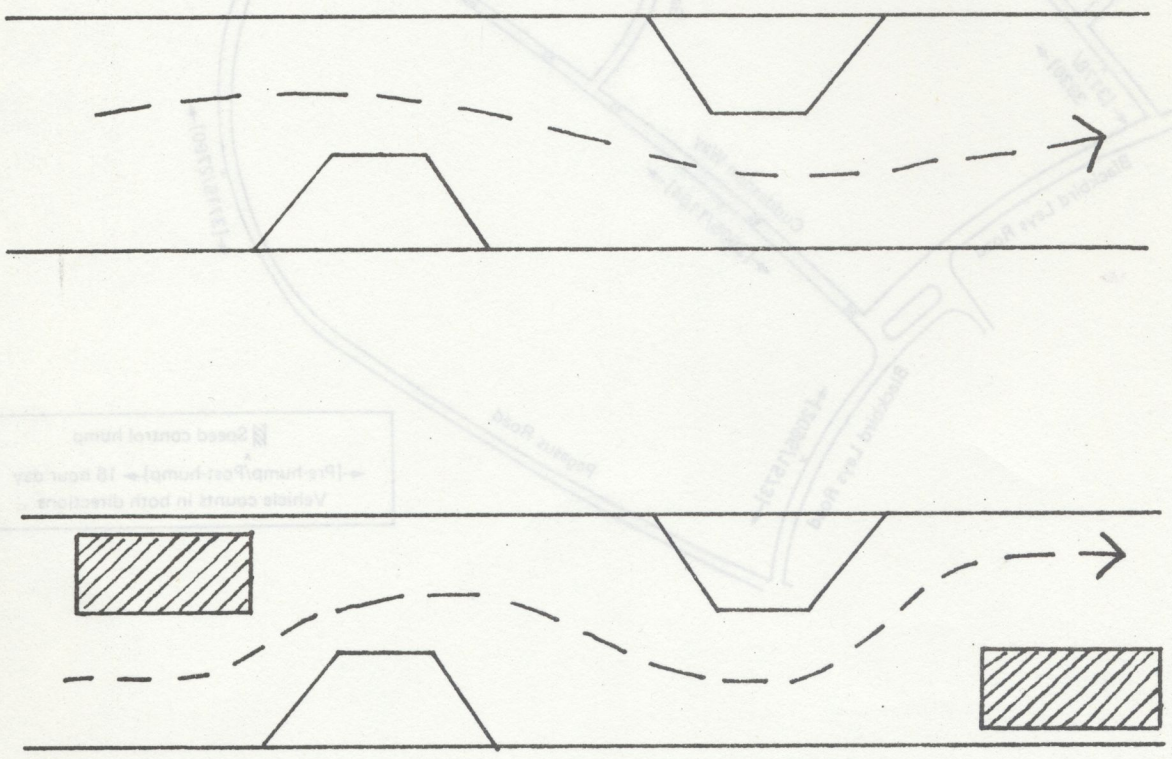


ALEXANDRA ROAD, NORWICH

At this inner-city location two road narrowing additions to the footway were constructed approximately 130 metres apart either side of a road junction. Warning signs were erected to advertise the road narrowing. The measure was funded from the highways budget and was instigated primarily for road safety reasons. The scheme also made a modest environmental and aesthetic improvement, however, by introducing a new hard landscape feature into the street.

Visual observation revealed that it was the narrowing feature with an informal chicane effect caused by parked cars that slowed traffic. Road narrowing on its own would have to be severe to effectively slow traffic. A useful crossing point away from parked cars has been created for pedestrians, but the on-street parking problem here did not appear to be particularly severe.

FIGURE 11: The road narrowing feature at Alexandra Road, Norwich, in diagrammatic form. The upper diagram shows the minimal chicane effect without parked cars, while the lower diagram shows how the chicane effect (and speed reduction) can become more pronounced when parked vehicles are present.



URBAN ROAD SAFETY PROJECT, SHEFFIELD

There are five experimental study areas within towns and cities in England where area-wide accident prevention measures are being tested. The towns taking part in this Government-sponsored scheme, called the Urban Road Safety Project, are Bradford, Bristol, Nelson, Reading and Sheffield. The aims of the project are to:

> "(a) improve conditions on the main traffic routes both to make them safer and to make it practicable to discourage through traffic in residential streets; and
> (b) create conditions in which traffic requiring access to residential areas use their roads and streets safely, and can enter and leave the adjacent main traffic route safely."
>
> (Ward and Allsop 1982; 424)

The project makes little use of measures considered in Chapter 3 because it is mostly classified roads that are treated, residential roads being adapted only to the degree necessary for the implementation of traffic management schemes to discourage through traffic.

The Sheffield scheme in the Parson's Cross area of the city shows a concentration of measures on major roads. In this scheme there is little to encourage slower speeds on residential access roads, although some attempt has been made to slow traffic on "distributor roads" within the area. At least one junction has been narrowed for pedestrian convenience, and rumble strips have been laid at the junctions of some residential roads and distributors. An approximate reduction of pedestrian accidents within the area of about 50% is shown by preliminary monitoring results, but this reduction is not spread evenly throughout the road hierarchy as shown in Table 10:

TABLE 10 Pedestrian Accidents in Parson's Cross, Sheffield

	12 month average before	Scaled 12 month ave. after	Reduction %
Arterial routes	16.0	10.3	35.6
Local Distributors	20.2	3.9	86.7
Residential Areas	13.4	10.3	23.1

(source: Sheffield City Council)

The lower reduction in accidents in the residential areas suggests that the scheme may have had less effect on child pedestrian casualties.

The scheme has not been popular with residents (personal communication; Sheffield City Council Road Safety Unit), apparently because of the "waste of money" involved and the inconvenience to drivers, but maybe more fundamentally because no public participation exercises preceded the implementation of the scheme.

PHOTO 5: Pedestrian bollards added to a local distributor road in Parson's Cross to aid pedestrians crossing and to slow traffic.

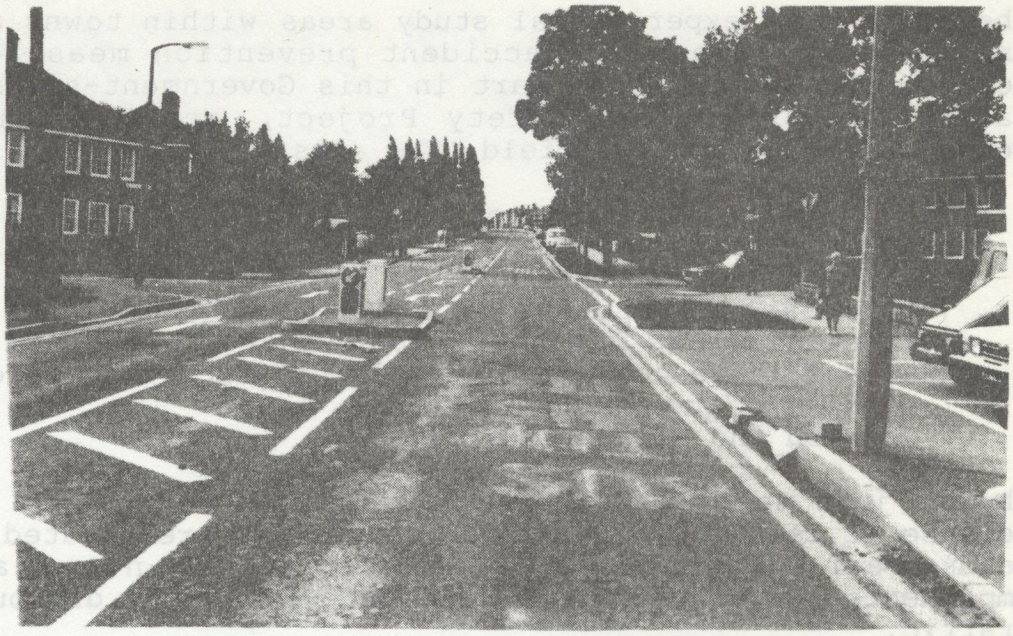


PHOTO 6: Rumble strip at the entrance to a residential road, Parson's Cross.

BROOMHALL, SHEFFIELD

The initiative and pressure for both the housing action area (H.A.A.) and the traffic management scheme in this inner part of Sheffield came from an existing local residents' group. When set up, the H.A.A. status and the formal consultation process within this gave residents a structure for involvement in planning for the traffic scheme as well. Residents' participation was also strengthened by a "Planning for Real" exercise based on the scheme.

The main traffic problems were rat-running through traffic, and circulating traffic and kerb-crawling due to street prostitution in the area. The use of road closures and one-way streets was agreed to be the best way to combat these problems, but the actual roads to be closed were disputed, perhaps inevitably. Figure 12 shows the layout of roads in Broomhall, and the through traffic counts for the morning peak prior to the road closures.

Most people accepted the closure of Broomspring Lane at its junction with Glossop Road, the steep gradient of this road encouraged traffic to travel particularly fast. A closure of the by-passed section of Upper Hanover Street, and the closure of Havelock Square each side of Brunswick Street in order to prevent the circulating traffic problem, were also not contentious. This left a major rat-run still open, namely Brunswick Street and the continuation along Collegiate Crescent.

A one-way gate (Photo 7) on Brunswick Street at its junction with Collegiate Crescent, or alternatively a road closure on Brunswick Street, just south of Wilkinson Street, was proposed to deal with this rat run. The latter proposal would have prevented the still remaining rat-run on the northern section of Brunswick Street as well (Figure 13), but was considered an unacceptable restriction on access by a small majority of residents. The scheme was therefore implemented with the one-way gate solution on Brunswick Street, after residents had voted for this, and the other less contentious proposals (also shown in Figure 13). Apart from the problems on the remaining rat-run, the scheme has worked to reduce traffic on many streets in the area and residents are generally happy with it. The increased traffic flow along Wilkinson Street causes less concern because most houses on this street have been converted to offices.

FIGURE 12: Through traffic flows during the morning peak in Broomhall, Sheffield, before the implementation of the traffic management scheme, to deter through traffic.

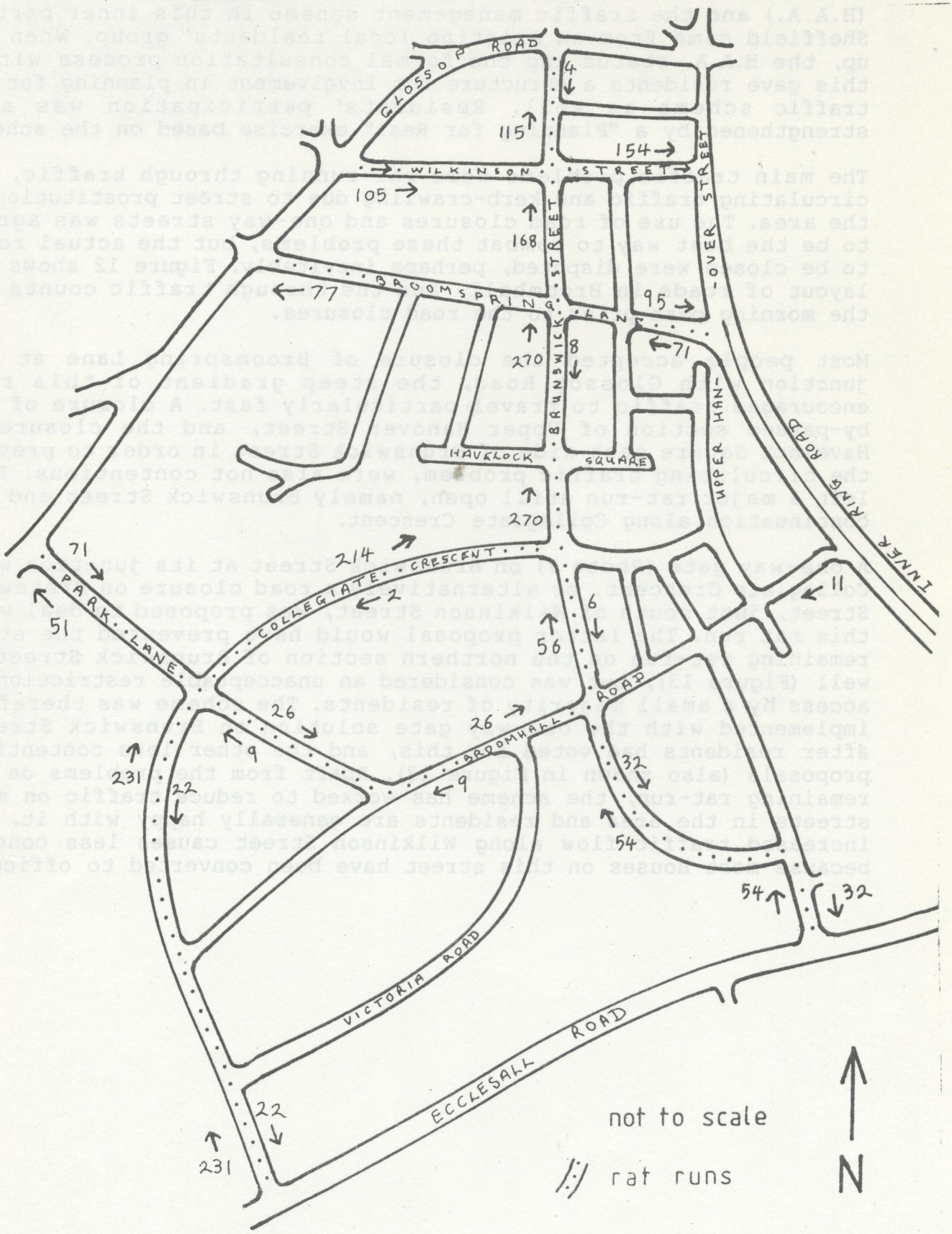
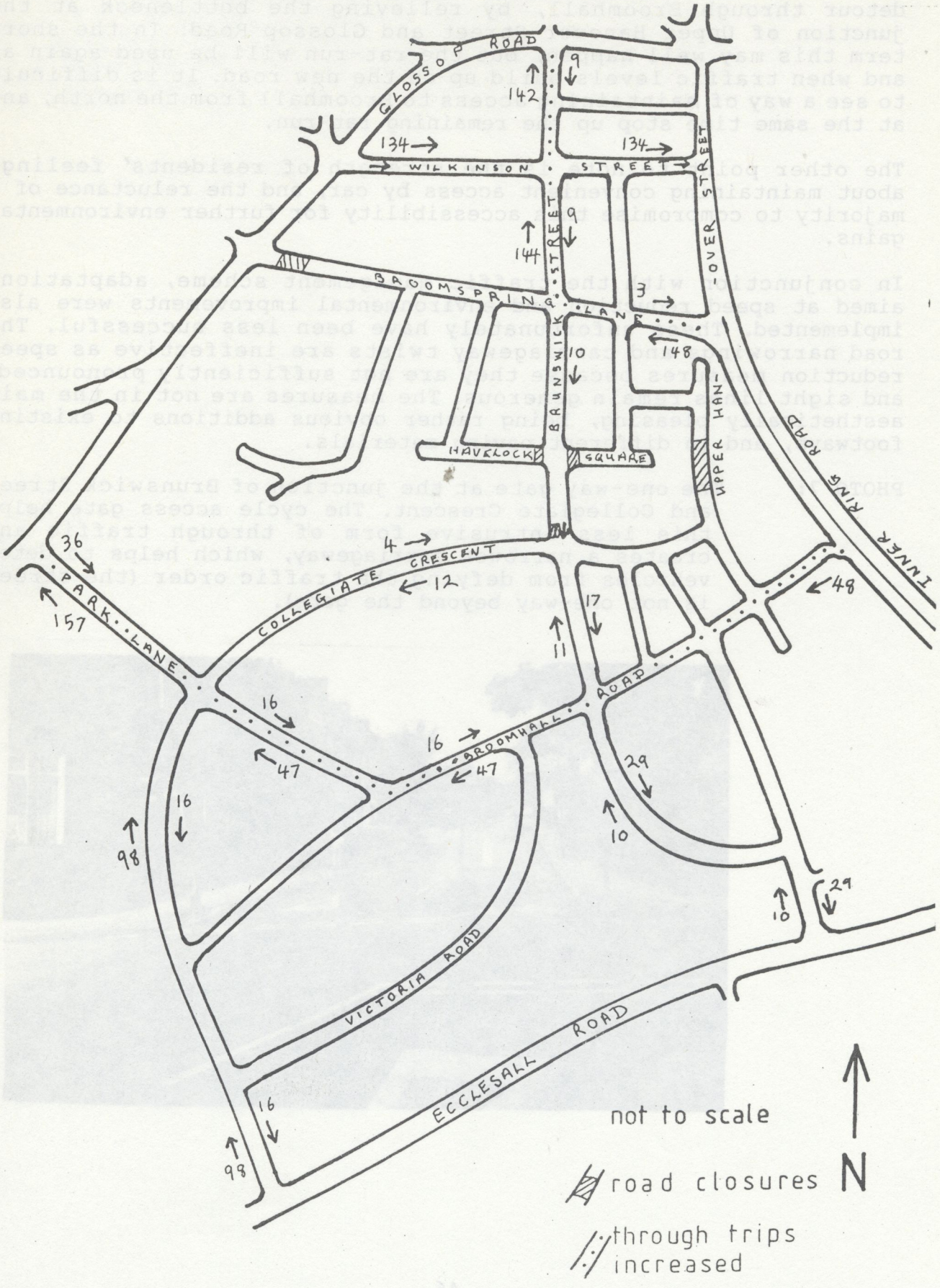


FIGURE 13: Plan of the road closures and one-way gate in Broomhall, Sheffield, together with through traffic counts taken after implementation.



The immediate question is whether all rat-run traffic can be excluded from this area without seriously impeding residents' ease of access. The highway authority at the time (South Yorkshire County Council) felt that completion of the Inner Ring Road to dual-carriageway standard should remove the temptation to take a detour through Broomhall, by relieving the bottleneck at the junction of Upper Hanover Street and Glossop Road. In the short term this may well happen, but the rat-run will be used again as and when traffic levels build up on the new road. It is difficult to see a way of maintaining access to Broomhall from the north, and at the same time stop up the remaining rat-run.

The other point to note is the strength of residents' feelings about maintaining convenient access by car, and the reluctance of a majority to compromise this accessibility for further environmental gains.

In conjunction with the traffic management scheme, adaptations aimed at speed reduction and environmental improvements were also implemented. These unfortunately have been less successful. The road narrowings and carriageway twists are ineffective as speed reduction measures because they are not sufficiently pronounced, and sight lines remain generous. The measures are not in the main aesthetically pleasing, being rather obvious additions to existing footways, and in different paving materials.

PHOTO 7: The one-way gate at the junction of Brunswick Street and Collegiate Crescent. The cycle access gate helps this less intrusive form of through traffic and creates a narrower carriageway, which helps to deter vehicles from defying the traffic order (the street is not one-way beyond the gate).

PHOTO 8: Junction narrowing and rumble strip in Broomhall. Neither have much effect on the speed of traffic or the appearance of the street.

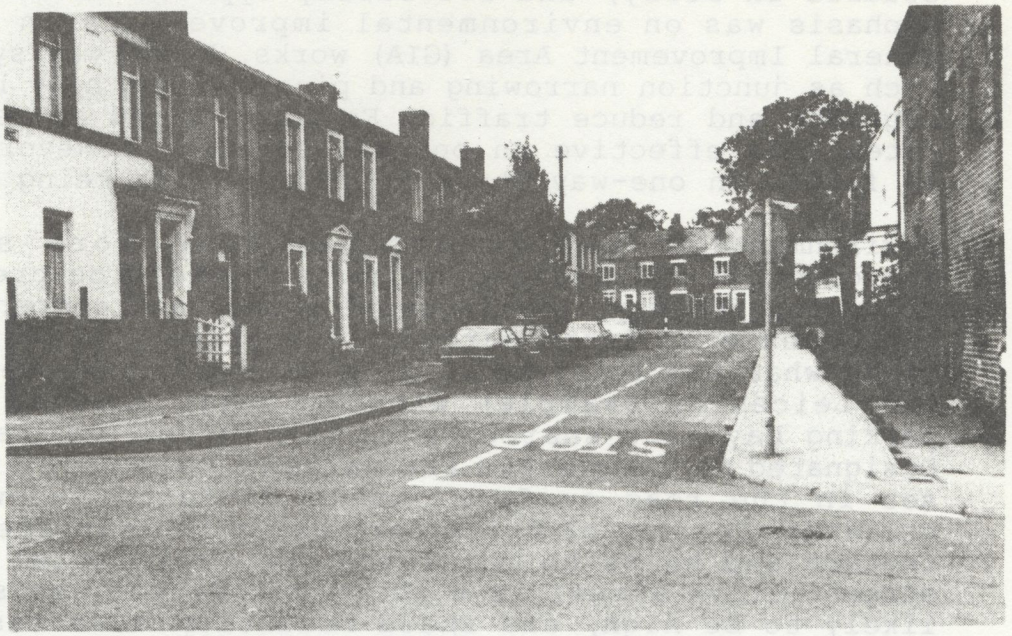


PHOTO 9: Chicane, Broomhall. Little use because it can be negotiated without any turn at all, and is also masked by parked cars on each side of the road.

LYNTON STREET, DERBY

Further road schemes associated with housing improvement were studied in Derby, and are fairly typical of such work. Here the emphasis was on environmental improvements in association with General Improvement Area (GIA) works. A one-way system and features such as junction narrowing and pinch points have been introduced to regulate and reduce traffic. Features aimed at reducing speeds are often less effective on one-way streets, however, because traffic is faster on one-way streets (other things being equal).

Environmentally the scheme has been more successful. The introduction of landscaping has softened the previous unrelieved "housing, footway, carriageway" scene, and compensated in part for the absence of front gardens. One street, Olive Street, has been given what was referred to as a "Woonerf" treatment, although (like the Leicester example) without legal changes in defining the parking bays and shared space, it is not a true Woonerf scheme. Designated parking areas are marked by a double line of blue bricks set in the road surface, and a de-facto footway is marked by bollards. The use of brick for the entire surface is an attractive feature and helps to reinforce the residential character of the street. Olive Street is a short cul-de-sac, so speeds were never likely to be high, and speed reduction measures on this street, basically two chicanes, are not sharp enough to have a speed reducing effect.

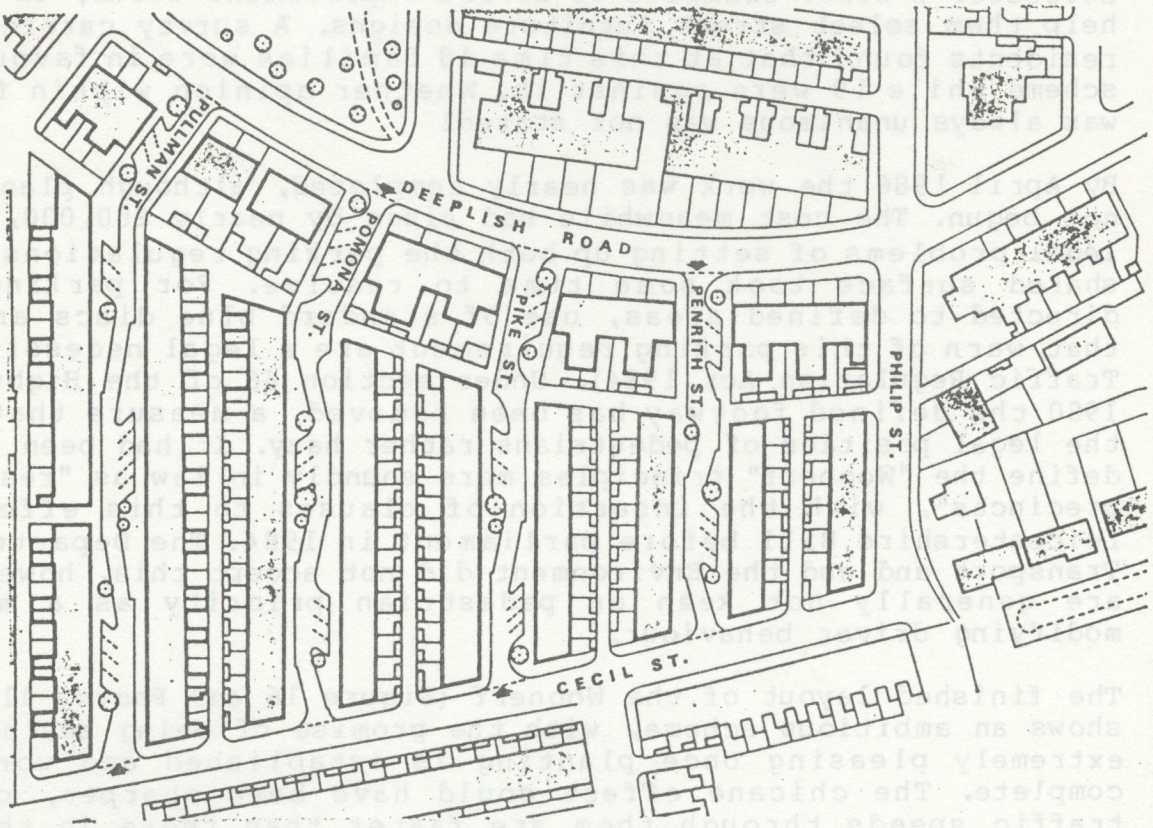
PHOTO 10: Lynton Street GIA junction narrowing, on a one-way street. This will help enforce the no entry rule, and is also designed to discourage the illegal roght hand turn out of the junction. Its speed reduction effect must be questionable, however.

DEEPLISH, ROCHDALE

The Deeplish area was the subject of a small pilot area improvement scheme carried out in 1967, one of several that tested many of the ideas subsequently included in the 1969 Housing Act. The chevron parking arrangement in the four small streets (Figure 14), and the landscaping are more ambitious than most subsequent GIA street improvements. The reasons for this must be partly connected with its "pilot" status, but also reflect the fact that in the early days of area renewal, street improvement was a greater priority than it is now.

In terms of traffic management, the scheme is a little cautious by present day standards. Despite the narrow carriageway, the one-way system would not now be considered necessary; a passing space would be a reasonable alternative. The design of the parking arrangement could have kept the chicane effect and the trees, but allowed more parking spaces. Present residents regard the lack of parking spaces as a major disadvantage, and not without reason. On Pomona Street there are 29 dwellings but only eight parking spaces in direct view of the dwellings.

FIGURE 14 The Deeplish Improvement Area
(Source: DOE Area Improvement Note 6)



WORTHINGTON STREET "WOONERF", LEICESTER

Worthington Street, like others within the Melbourne Housing Action Area, is lined with terraced housing fronting directly onto the street. Of the several streets at right angles to Melbourne Road within this area, Worthington Street had the highest usage by through traffic, with a peak flow of 130 vehicles per hour, due probably to its position, linking directly to Oxenden Street (Figure 15).

The City council were keen to implement "Woonerf" principles (explained in the Dutch case study following), and Worthington Street was considered a good location for an experimental scheme because:

1. There had been little spent previously on environmental improvements in the Housing Action Area.
2. On-street parking was light, and mostly residents cars.
3. Traffic conditions were suitable, with flows below the Dutch recommended maximum of 200 vehicles per hour.
4. During preliminary consultations, residents appeared to be in favour of the scheme.

Consequently by April 1984, a final scheme had been drawn up, and a bid approved for £120,000 from the Inner Area Programme. Residents' participation in this process was extensive and productive. They requested more parking spaces and got them, and made the final layout decision when they voted for one of two proposals. Additionally the street committee were taken on a tour of Leicester's other examples of street improvement works, in order to help them select street furniture designs. A survey carried out by residents found that at this time 40 families were in favour of the scheme while 19 were against it. Whether opinion within families was always unanimous was not stated!

By April 1986 the work was nearly completed, although planting had not begun. The cost meanwhile had risen by nearly £80,000, and the legal problems of setting up both the parking regulations and the shared surface took some time to resolve. For parking to be directed to defined areas, use of standard blue discs and signs that warn of this parking requirement are a legal necessity (Road Traffic Regulation Act 1984). Under section 66 of the Highways Act 1980 the defined footway has been removed, a measure that leaves the legal position of pedestrians rather hazy. It had been hoped to define the "Woonerf" principles more soundly in law as "residential precincts", with the insertion of clauses to this effect in a Leicestershire Bill before parliament in 1984. The Departments of Transport and and the Environment did not accept this, however, and are generally not keen on pedestrian priority as a means of modifying driver behaviour.

The finished layout of the Woonerf (Figure 16 and Photos 11 and 12) shows an ambitious scheme, with the promise of being aesthetically extremely pleasing once planting is established and work on it complete. The chicane effect could have been sharper, observed traffic speeds through them are faster than those in the Dutch schemes and the Southall scheme, for example. It is too early to be able to fully assess the success of the scheme, but it is a close

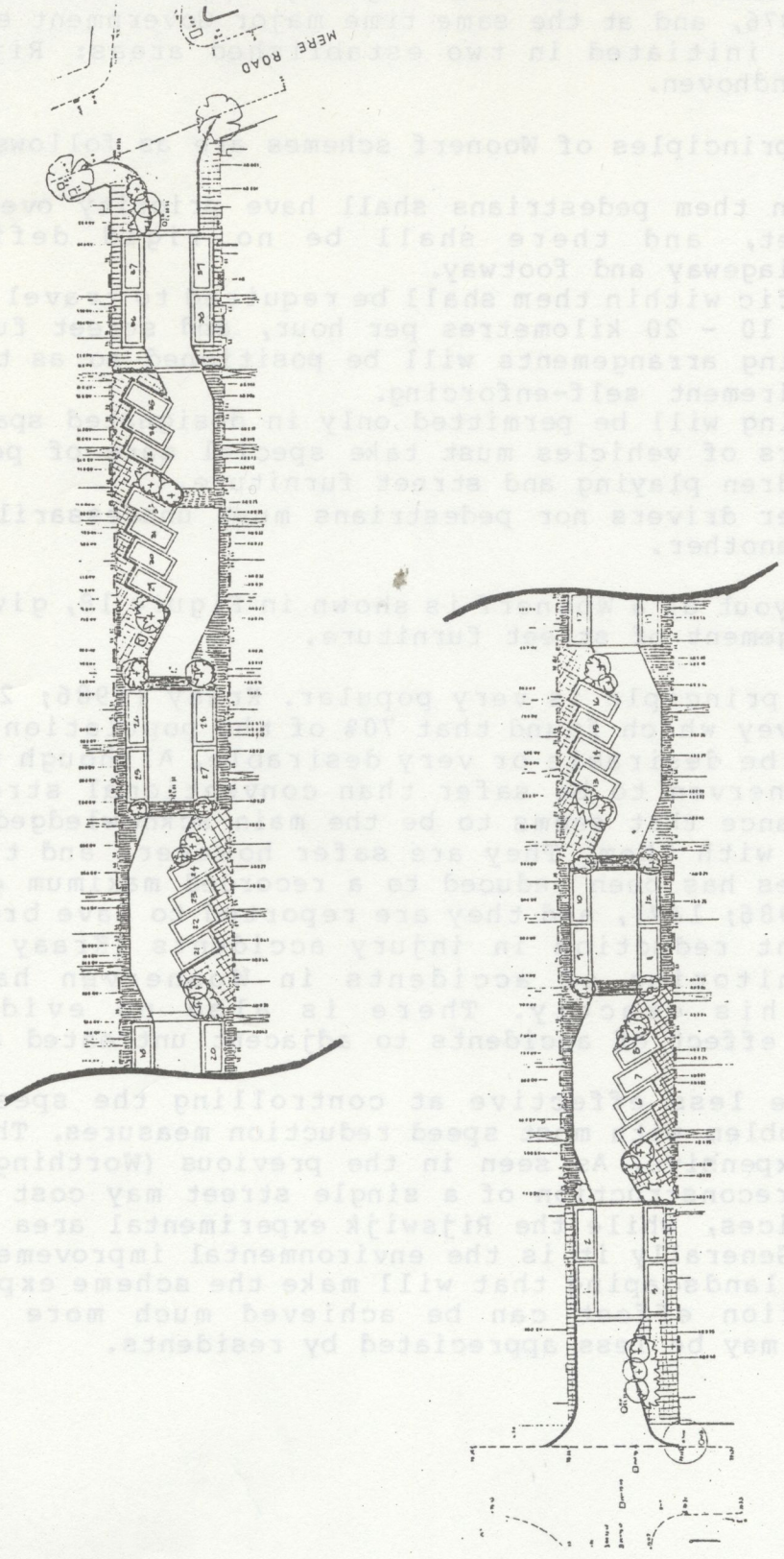
approximation to the Dutch Woonerf, implemented with two-way traffic, designated parking spaces, and the nearest to shared surface possible within current traffic law. (Information on the scheme from Leicester City Council committee reports.)

FIGURE 15: Plan of the Melbourne Housing Action Area showing the location of Worthington Street.

PHOTO 11: The standard sign for defining a particular parking space, as used in Worthington Street.

PHOTO 12: View of the street, with planting the only work on the scheme outstanding. Generally a high standard of paving and street furniture, making good use of Leicester's attractive red bricks.

FIGURE 16: Plan of the Worthington Street Woonerf layout.



WOONERF SCHEMES, THE NETHERLANDS

The recognition of children's vulnerability on residential streets, and action to change the priority given to motor vehicles within them, began much earlier in the Netherlands than elsewhere. Publication of the initial Woonerf ideas in 1970/71 (Delft Public Works Department) led to new highway regulations for Woonerf streets in 1976, and at the same time major Government experimental schemes were initiated in two established areas: Rijswijk (Den Haag) and Eindhoven.

The general principles of Woonerf schemes are as follows:

1. Within them pedestrians shall have priority over the whole street, and there shall be no rigid definition of carriageway and footway.
2. Traffic within them shall be required to travel at not more than 10 - 20 kilometres per hour, and street furniture and parking arrangements will be positioned so as to make this requirement self-enforcing.
3. Parking will be permitted only in designated spaces.
4. Drivers of vehicles must take special care of pedestrians, children playing and street furniture.
5. Neither drivers nor pedestrians must unecessarily obstruct one another.

A typical layout of a Woonerf is shown in Figure 18, giving an idea of the arrangement of street furniture.

The Woonerf principle is very popular. Kraay (1986; 21) quotes a national survey which found that 70% of the population considered Woonerven to be desirable or very desirable. Although most people consider Woonerven to be safer than conventional streets, it is their appearance that seems to be the main acknowledged reason for satisfaction with them. They are safer however, and the speed of motor vehicles has been reduced to a recorded maximum of 21.8 kmph (Hass-Klau 1986; 147), and they are reported to have brought about a significant reduction in injury accidents (Kraay 1986; 25), although monitoring of accidents in Woonerven has not yet quantified this exactly. There is also no evidence of a transference effect of accidents to adjacent untreated areas.

Woonerven are less effective at controlling the speed of motor cycles, a problem with most speed reduction measures. They are also relatively expensive. As seen in the previous (Worthington Street) case study, reconstruction of a single street may cost £200,000 at mid 1980s prices, while the Rijswijk experimental area scheme cost £7 million. Generally it is the environmental improvements such as repaving and landscaping that will make the scheme expensive. The speed reduction effect can be achieved much more simply and cheaply, but may be less appreciated by residents.

FIGURE 17: The variety of parking arrangements used within Woonerven, no narrow the "carriageway", create chicanes and sometimes to provide as much parking as possible within the street.

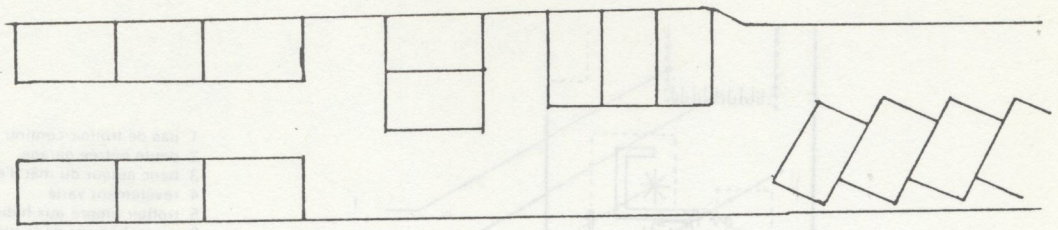
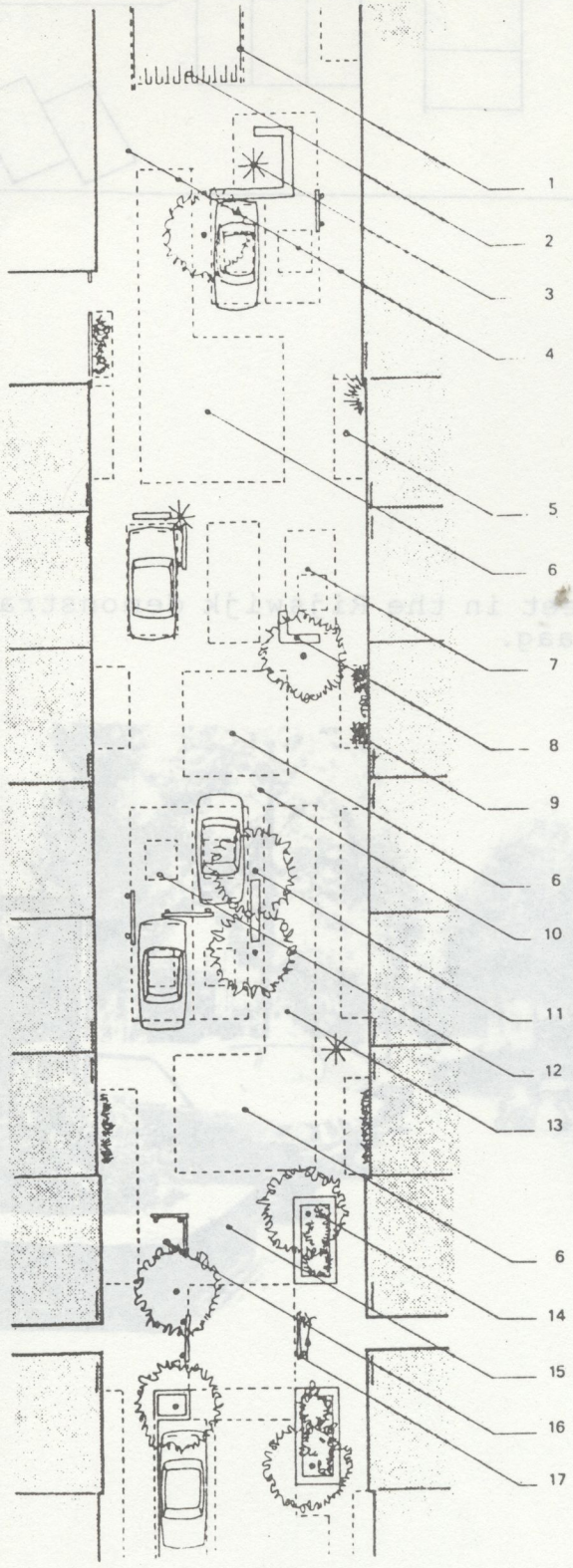


PHOTO 13: A Woonerf street in the Rijswijk demonstration area project, Den Haag.

FIGURE 18: A typical layout of a Dutch Woonerf
(source: Royal Dutch Touring Club [ANWB] 1980; 8)



1. pas de trottoir continu
2. petite entrée garage
3. banc autour du mât d'éclairage
4. revêtement varié
5. trottoir propre aux habitants
6. décrochement de la bande roulante
7. emplacement de stationnement non occupé, destiné au jeu et au repos
8. petit banc/élément de jeu
9. sur demande: espace de plantation devant la façade
10. absence de continuité de la bande roulante dans le revêtement
11. arbre
12. espaces de stationnement marqués au sol
13. passage étroit
14. bac à plantes
15. aire de jeu de façade à façade
16. stationnement impossible par obstacles
17. barrière notamment pour le stationnement des deux-roues

1. no continuous kerb
2. private access
3. bench around low lighting column
4. use of varied paving materials
5. private footway
6. bend in the roadway
7. empty parking lot: place to sit or play in
8. bench/play object
9. on request: plot with plants in front of facade
10. no continuous roadway marking on the pavement
11. tree
12. clearly marked parking lots
13. bottleneck
14. plant tub
15. space for playing from facade to facade
16. parking prevented by obstacles
17. fence for parking bicycles etc.

1. kein durchgezogener Bordstein
2. Zufahrt
3. Ringsitz um niedrigen Laternenpfahl
4. variierte Pflasterung
5. privat Auftritt
6. Knick in der Fahrtrichtung
7. leerer Parkplatz bietet Platz zum Sitzen oder Spielen
8. Ringsitz/Spielobjekt
9. auf Wunsch: bepflantztes Fach vor der Hausfassade
10. keine durchgehende Fahrspurbezeignung auf der Pflasterung
11. Baum
12. deutlich markierte Abstellplätze
13. enge Durchfahrt
14. Pflanzentopf
15. Spielgebiet von Fassade zur Fassade
16. Parken durch Hindernisse unmoglich
17. Zaun u.a. zum Abstellen von Fahrrädern

VERKEHRSBERUHIGUNG (TRAFFIC CALMING), WEST GERMANY

Work to improve the safety and environment of residential roads has been undertaken in many European countries to a greater extent than in Britain. Denmark, the Netherlands and West Germany provide particularly useful examples.

In West Germany the Buchanan approach, using road closures and one-way systems to create environmental areas, has fallen out of favour. Such measures are recognised to have limited value because of problems of access for residents, problems created by diverted traffic, and because the measures do not in themselves change driver behaviour or road user attitudes within the residential streets.

It has been replaced firstly by physical speed-reducing adaptations to residential roads that are combined with environmental improvements often aimed specifically at "greening" the street. There are also many areas with lower speed limits of 30 kmph, though these have been generally less effective unless backed up with physical speed reducing measures (Bowers 1986; 64).

Measures used include those used in the Dutch Woonerf examples for streets with high residential density and no through traffic function. On other residential streets, alternate parking to create chicanes has been widely used in 30kmph zones, which are now widespread. There are a wide variety of techniques employed to raise the carriageway level to achieve low speeds. "Speed tables" or "plateau" are favoured more than speed humps, because they encourage a "calmer" style of driving, and usually avoid the irritating acceleration and deceleration commonly found where humps are installed. In West Germany street adaptations have now become normal practice in most urban areas. In the Nordrhein-Westfalen region, for example, there were said to be more than 2,000 schemes known to the Ministry in 1986, and this has allowed a substantial programme of evaluation and research (see the example in Table 8, Chapter 3). The Deutches Institute for Urbanistik in Berlin has more than 1,000 documents on the subject of traffic calming.

As in Holland, there is in many cities a stated objective of making residential areas less attractive for short trips by car but more attractive for cyclists and walkers. West Germany, in common with many European countries, is also investing heavily in public transport, and the schemes for residential road improvement are often presented as part of broader strategies which embrace traffic restraint on arterial roads, and transfer of traffic from private to public transport.