CAMBRIDGE CYCLEWAYS REPORT

September 1975

CONTENTS.

FOREWARD.

Whilst it had been the intention of the City Council for some time to study the problem of providing better facilities for cyclists, this present report has been prepared at the invitation of the County Council with the full support of the City Council.

Prior to the invitation from the County Council, Councillors Lipstein, Peel and Percival produced a report and plan which made proposals for a segregated cycleway system within the City. Their proposals have been studied and in part incorporated in this report.

Work on this report has been carried out jointly by members of the staff of the City Architect and Planning Officer and the City Engineer and Surveyor, as follows:-

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1. BACKGROUND.

The Benefits and Problems of the Bicycle.

1·1 There has been a growing realisation in recent years that the unrestrained use of the private car is no longer a feasible option in most cities and attention has therefore been focussed on alternative forms of transport, notably improved public transport and thegreater use of the bicycle, as a means of reducing congestion and over-use of the motor car.

1·2 Much has been written in recent years about the bicycle and, as an introduction to this report, it is only necessary to reiterate briefly the main advantages and disadvantages of its use.

1·3 Its main advantages are that it makes little demand on material or energy resources; it creates little or no pollution; it is economic in terms of the use of limited road space; it is a personal means of door to door transport available to a wider range of the community than the car; it is relatively cheap to buy and inexpensive to maintain; in itself it is relatively safe; for short journeys it is almost as quick, door-to-door, as the car; although it can be uncomfortable in bad weather it is generally regarded as making a contribution to good health. In short, the bicycle must be regarded as a benevolent machine whose higher usage would bring environmental benefits.

1·4 The main disadvantage of using a bicycle is that in general it has to compete for road space with bigger, faster and less manoeuvrable vehicles. When bicycles and other vehicles are involved in accidents it is almost certain that the cyclist comes off the worst. Various reports suggest that the proportion of serious casualties compared with slight injuries is relatively higher for cyclists than for car drivers and passengers. In 1971, for example, in the country as a whole, for every 100 million miles travelled 1·6 car occupants were killed. This compares with a figure of 14 deaths per million miles travelled by cyclists. Child cyclists are more at risk than adults.

1·5 If, therefore, one accepts that greater use of the bicycle would be advantageous and that the dangers involved in cycling must be reduced, it follows that a high priority must be given to the provision of more adequate facilities for cyclists than at present exist. In particular attempts must be made to reduce the possibility of conflict between cyclists and other road users, and whilst continued programmes of road safety training and greater levels of understanding and courtesy amongst road users would help, the only certain way to provide for the greater use of the bicycle without

increasing the risk of accident is to make physical provision which separates, wherever possible, the cyclist from other types of vehicle.

2. THE EXISTING SITUATION IN CAMBRIDGE.

2·1 In the final report of the Cambridge Transportation Study, 1972, the situation is summarised explicitly.-

> "Cambridge is famous for its bicycles. The swarm of cycles in Trinity Street and King's Parade, the gowns and books and bicycle baskets are an essential part of the flavour of the University Town."
>
> "Cambridge's bicycles are associated with its function as a University town but it would be a mistake, however, to neglect consideration of the use of bicycles in other parts of the City and by other than the residents of the University. Household residents account for 71% of daily cycle trips and about 76% of daily cycle miles."

2·2 Of the total number of trips made on a typical weekday in 1967 by all those who lived within the study area for all purposes (548,370) 22% were made by bicycle (121,220). Of these bicycle trips 90,480 were made by people living in the City.

2·3 Furthermore, Cambridge has a high proportion of cycle trips to work made by people living and working in the City as the following table shows.-

<u>% of Residents Cycling to Work in L.A.</u>.

	Cambridge.	Peterborough M.B.	Oxford.	Swindon.	Norwich.	Portsmouth.	Stevenage.	Harlow.	Cheltenham.	Daventry.	Nottingham.	Wandsworth.
1966	36·5	36·9	23·2	20·9	21·6	15·9	11·7	14·3	21·8	4·4	4·1	3·5
1971	30·0	25·1	-	-	12·8	10·2	9·0	8·9	5·6	4·1	-	2·0

2·4 Although there has been a decline in the 5 years 1966-71, the 10% sample Census of 1971 showed that more City residents went to work in the City by bicycle than by car. The five year decline probably reflects to a large extent the growth in car ownership:-

	1966.	1971.
% of City residents owning cars.	17·4%	20·25%
% of City residents cycling to work in City.	36·5%	30·0%

2·5 Certain areas of the City attract more cycle trips than others and consequently determine the major patterns of cycle movement. The desire lines (diagrammatic representations which link the centres of the zones of origin and destination) show the concentration of movement that one would expect between the college and University areas in Central and West Cambridge, but also show significant concentrations in the areas of Mill Road and Chesterton.

2·6 When these desired movements are actually assigned to the road network, Diagram 1, the pattern that emerges shows again the concentrations of use in the Central Area and West Cambridge, but also shows that many other trips have to be made on main radial roads, especially the Newmarket Road, Mill Road, Chesterton Road and parts of Hills Road, with generally more cycle traffic on most roads in the eastern part of the City than the west.

2·7 Diagrams 2a and 2b show the existing system of roads and other ways where cyclists have some degree of priority, ranging from paths across open spaces where there is no other traffic to central area streets where the restrictions on general traffic flow recently introduced experimentally give the cyclists a considerable measure of increased safety.

2·8 Diagram 3 shows the location of accidents in Cambridge involving cyclists between 1972 and 1974. This shows quite clearly a concentration in the central area (which the present traffic management scheme should go a long way to minimise) and on major approach roads to the centre, notably Mill Road, Hills Road and the southern end of Huntingdon Road. The diagram also clearly shows that it is at junctions where the cyclist is most vulnerable and that narrow roads are more dangerous than wide roads.

2·9 The conclusions which can be drawn from this appraisal of the existing situation in the City are as follows -

a) Given that there are already a significant number of trips made by bicycle and, consequently, that cycling is eminently feasible in the City, a combined policy of further restraint on private car trips and better facilities for cyclists could effect a further transfer of people from cars to bicycles with benefits both to the environment in general and to other road users who must continue to travel by bus or car. It must be remembered, however, that the existing use of bicycles is high compared with other towns and so the scope for such a transfer is probably limited.

b) The existing level of special provision for bicycle movement is generally inadequate in that the existing system of routes where the bicycle has priority is fragmentary.

c) The major problem areas for cyclists are along heavily trafficked and congested roads notably on some of the approach roads to the City Centre mostly on the east side of the City.

d) The cyclist is most accident prone at junctions and roundabouts where he has to weave between other traffic movements, and is often at his slowest and least stable pace.

2·10 From these conclusions it is possible to draw up a list of objectives against which any proposals should be judged. They are as follows:-

a) To extend wherever possible the system of routes for bicycles in order to separate the cyclist from other road users.

b) To provide, where necessary, some means of giving the cyclist protection and/or priority on existing roads and junctions where separate cycleways are not feasible.

2·11 In attempting to achieve these objectives the following points must be borne in mind:-

a) The objectives must be compatible with other transportation objectives as detailed in the County Council's

Volume of Cyclists on City Roads

Diagram 1

Key — per 24 hour day

2000 4000 6000 8000

Source: R. Travers Morgan 1967 surveyed pedal cycle network

Note: Existing cyclepaths are not included; this may affect the assignment network

0 ¼ ½ ¾ 1

Scale (Miles)

Existing Cyclepaths

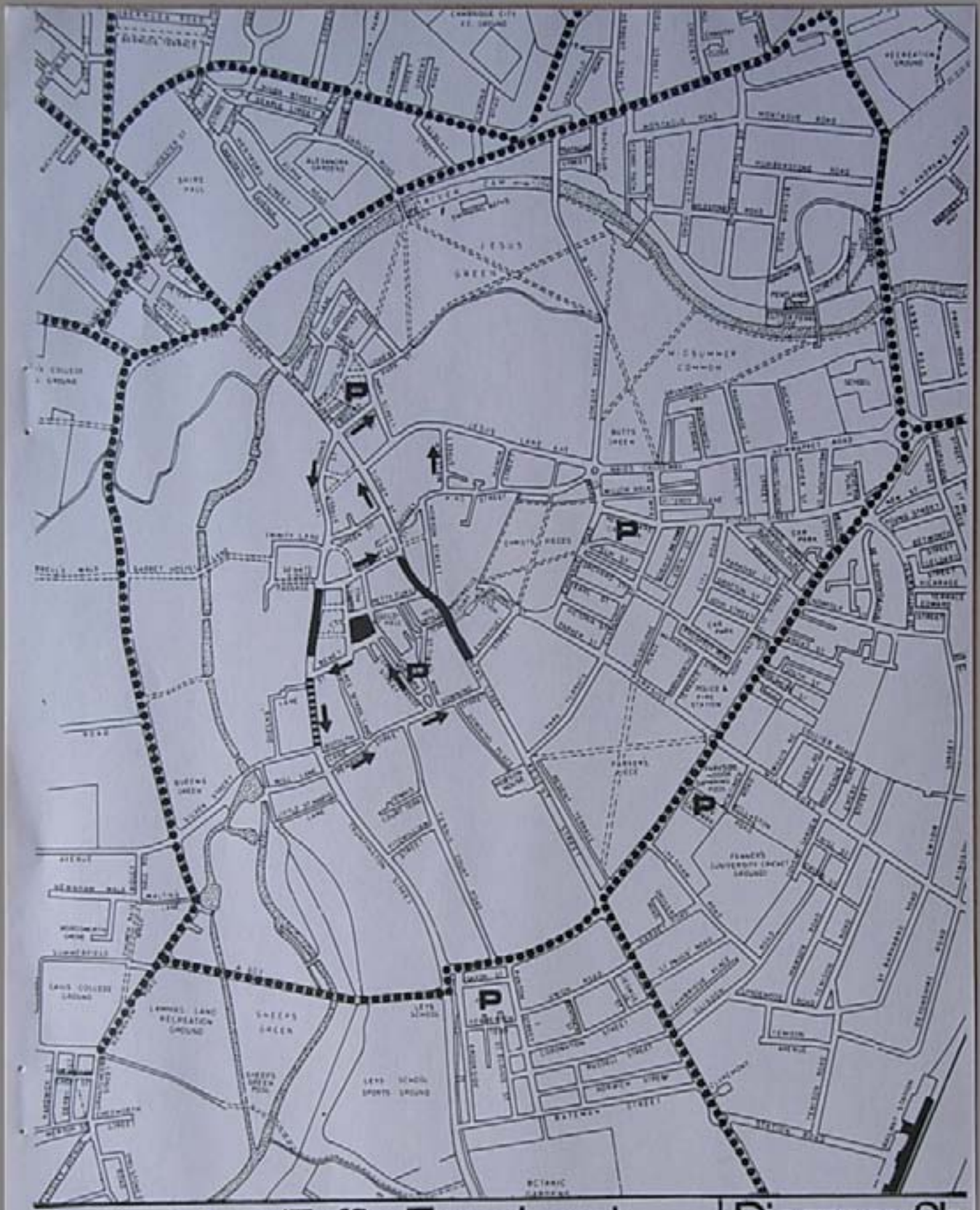
Diagram 2a

Key ..... Existing Cyclepaths

Scale

0 ¼ ½ ¾ 1

Miles



Central Area Traffic Experiment

Diagram 2b

Stage I

Key:
- Buses, taxis, pedal cycles, invalid & service vehicles only.
- Two-way for these vehicles, otherwise one-way
- Main routes

Scale

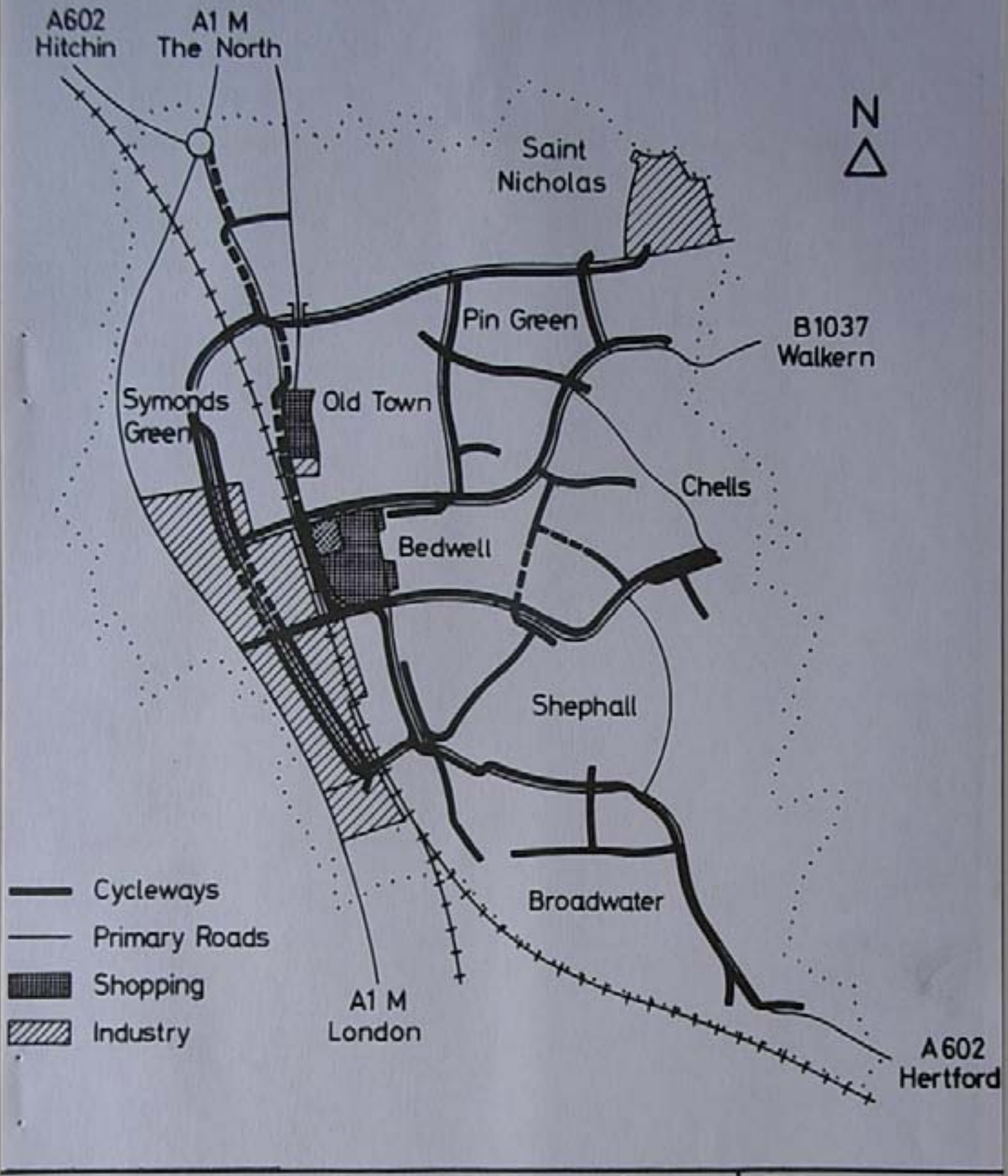
0 ¼ ½ ¾ 1 Miles

Location of Cycle Accidents 1971-4

Diagram 3

Key:
- 1
- 3
- 5
- 10
- 11

Scale (Miles)



Stevenage Cycleway Network

Diagram 4

Scale

0 1/4 1/2 3/4 1Mile

"Transportation Policies and Programme".

b) The provision of any preferred system of cycle facilities must come within the financial resources likely to be allocated for this purpose in the County Council's "Transportation Policies and Programme".

c) In providing facilities for cyclists on existing roads and junctions there should be no severe impediment to other road users, and in particular to public transport, which would interfere with the free flow and safety of traffic. Some restriction of other traffic may be possible provided that alternative routes are available.

2·12 From this analysis of the existing situation it is possible to draw up a PREFERRED NETWORK of routes on which some special provision for bicycles is desirable. This is shown in MAP 1. Also shown on this map are areas where safe cycling conditions prevail on existing roads and where designated cycle routes are not considered to be necessary. The roads in these areas also provide links between parts of the primary cycle network. The subsequent sections of the report look at ways of providing a network based on this preferred network.

3. POSSIBLE ALTERNATIVE SYSTEMS.

3·1 Despite the growing body of reports by various towns and organisations in this country and abroad concerned with better facilities for cycling in urban areas, there is no widely accepted solution which is immediately and obviously applicable to the Cambridge situation.

3·2 The following systems have been examined, however, to establish their advantages and disadvantages -

a) Segregated cycle networks.

b) Traffic management schemes.

c) Alternative routes on minor roads.

d) Cycle lanes on existing carriageways.

Segregated Cycle Networks.

3·3 A segregated network provides purpose built tracks for cyclists alongside or away from the main roads. Where there are junctions or other points of conflict between the cycle track and the road, the two systems are usually grade separated i.e., the cycle track goes over or under the road. In these cases the preference is for the track to be carried under rather than over the road as the lower headroom required (7 feet 6 inches instead of 16 feet 6 inches) allows shorter and shallower ramps to be used. The segregated network usually caters only for areas of major movement on heavily trafficked routes, and road and cycletrack usually merge in the quiet roads of residential areas.

3·4 One of the best examples of segregated cycleways in this country is at Stevenage New Town, where there are 23 miles of cycleways and 90 underpasses. The system links the majority of residential areas with the town centre and the major industrial areas. (See Diagram 4.). The system is clearly beneficial in that accidents on the cycleways are much less common than on normal roads. In Stevenage the number of accidents on the cycleways is 2·3 per million cycle miles. (In the town as a whole, however, the rate rises to 4·3 per million cycle miles, compared with 4·08 per million cycle miles in Cambridge). The network has also had some effect in slowing the decline of cycling to work compared with other towns (See table in paragraph 2·3). However, it is notable that the percentage of residents cycling to work is still relatively low (9·0% in 1971) due undoubtedly to the good primary road system and to an efficient public transport network. These general comments also apply to the system being implemented in Peterborough New Town.

3·5 Both Stevenage and Peterborough had the advantage of being able to plan their transportation systems from scratch on green fields sites. Provision on a similar scale is not feasible in Cambridge because of the existing pattern of the urban fabric. In many parts of the town there are built up frontages to the roads leaving little or no space for providing a new network.

Nevertheless, the existing road system has been examined to see where it would be possible to provide cycle tracks. The basic criteria used for this examination have been in the first instance purely spatial ie., where was there enough space to actually provide a segregated track while maintaining a two-way flow of other traffic. The minimum highway widths necessary, assuming no parking or loading and unloading, are as follows:-

Footpaths:	2 metres.
Cycletrack:	1·2 metres single direction. 2·2 metres two-way direction.
Carriageway:	6 metres on main roads. 5·5 metres on minor roads.
Dividing Strips:	A total of 1·4 metres.

3·7 Those parts of the Preferred Network (Map. 1) where segregated cycletracks are theoretically possible are shown on Map 2. It should be stressed that a variety of possibilities are inherent in the network ranging from places where it is necessary to take up all available highway space, including verges, to places where the cycle track can be accommodated within the existing carriageway.

3·8 Having established a maximum possible network on spatial parameters, it is necessary to evaluate each part of the system further to see where the provision of a cycletrack is a really practicable proposition. This involves consideration of the following factors:-

a) Need. The roads in the City carry different volumes of cyclists. Diagram 1 shows this. The practicability of providing cycletracks needs to be judged against a potential level of usage, and if choices are to be made priority must be given to those roads carrying the heaviest volumes.

b) Where a cycletrack is not placed wholly on the verge it would be necessary to eliminate all kerbside parking, including loading and unloading.

c) Where a cycletrack can be accommodated on the existing carriageway account must be taken of the resultant effect on congestion, in that a 1·2 metre cycletrack could effectively eliminate one traffic lane.

d) Where it would be necessary to take verge space, and especially where the verges contain trees, a difficult decision has to be made on the environmental impact of the proposals.

e) Continuity. The longer the length of uninterrupted cycletrack the more practical its use becomes. On many roads in the City there are numerous crossings from the road to individual properties. If the number of move-

ments per day are small (i.e., to private houses' drives and garages) there is little problem, but where the crossings serve commercial premises the problem is more acute. The major problem of disruption, however, comes from the number of side roads which have to be negotiated. In average conditions, side roads at closer than 100 yard intervals would be very disruptive to any potential cycletrack. The proposal to mark the cycletrack across sideroads could be dangerous, especially where sight lines for the side roads would be affected.

f) Cost of provision.

3·9 It is this last factor, the cost of provision, which rules out the widespread application of a totally segregated cycle network. A preliminary estimate based on the proposals put forward by Councillors Lipstein, Peel and Percival showed costs to be in the order of £1·3 million. This did not include certain unknowns connected mainly with the provision of underpasses, land acquisition, resiting of street furniture, lighting the cycleways and alterations to existing services. The yardstick against which to measure this estimate is the amount of money allocated in the Transport Policies and Programmes report by the County Council, where some £0·2 million is shown for cycleways in the first five years and a further £0·25 for years six to fifteen. It is not yet known how much of this allocation will become available in reality but with present trends it seems that some cuts in these allocations may be seen whereas costs of provision must rise, thus worsening the gap between what is desired and what can be achieved.

3·10 One other difficulty is that according to the present law, cycletracks can only be built in or alongside a highway containing a carriageway. There are no legal powers to construct them in any other locations. It is probable that in other locations they would have to be built and maintained as "footpaths" and legal problems could arise from their status.

<u>Traffic Management Schemes.</u>

3·11 The main aims of traffic management schemes are usually the improvement of traffic flows, road safety and the environment but measures aimed at restraining other vehicles whilst leaving cyclists unaffected can have significant benefits for

cyclists, as well as for other forms of public transport. Much has been written already about the restraint of traffic in the central area of the City and it is not necessary here to reiterate the arguments and counter arguments. What is extremely valuable is that the traffic management experiment is going on at present, and the effects on cyclists are observable.

3·12 The first and most immediate effect has been a reduction in the amount of traffic using central area streets, thus making conditions for cyclists more tolerable. This is particularly noticeable in King's Parade/Trinity Street/St. John's Street, and in Sidney Street/St. Andrew's Street which are all heavily used as cycle routes.

3·13 This reduction in general traffic levels has also benefited cyclists at particularly bad junctions, such as the Hobson Street/St. Andrew's Street corner which was previously very difficult; at the Round Church corner where considerably less traffic is making complex crossing movements, and at the Senate House Hill/St. Mary's Street corner, where now virtually all traffic makes a simple left turn from Trinity Street.

3·14 In addition, cyclists now have almost complete priority on certain restricted streets, notably King's Parade and Sidney Street/St. Andrew's Street.

3·15 In generalterms, therefore, the central area experiment is benefiting the cyclist on roads within the "inner ring" at very little direct cost or environmental detriment (in terms of signs, changes to the fabric etc.) and it is worth considering whether any other parts of the City could be treated in a similar way.

3·16 Those parts of the Preferred Network (Map 1) where Traffic Management schemes appear to offer potential advantages are shown on Map 2.

Cycle Lanes.

3·17 Another potential method of giving the bicycle some priority on the road network is that of marking cyclelanes on the existing carriageway. Whilst the cyclist is not entirely separated from other traffic his situation would be better than with no provision at all.

3·18 The advantages of a cyclelan over the segregated cycletrack are that the cyclist still uses the carriageway, and thus

the whole road network is available to him: total width of the cyclelane is some 0·5 metres narrower than the cycletrack on the carriageway in that separating facility is not required; the cost of provision is tiny by comparison, approximately 9p per linear metre as against approximately £5·00 for cycletracks; the system has flexibility in that it can be modified at the cost of a new set of road markings, and can be introduced (and discontinued) on an experimental basis; the cyclelane can be extended in width, either to cope with areas of heavy cycle flow or to enable buses to share the priority facility; the cyclelane can be operative on a time basis, e.g., at peak traffic times only; the cyclelane can be used in the opposite direction to general traffic flow on one way streets (as has been done in Oxford).

3·19 The disadvantages of cyclelanes, however, are also readily apparent. The most immediate problem is one of contravention by other road users. This certainly happens in towns where bus priority lanes have been established. Cars tend to keep out of the lanes when there are buses in sight but to enter them when bus traffic is light. It is possible that this would happen with cyclelanes, although the narrowness of the lane would not give other road users the opportunity of overtaking on the inside as they can in bus lanes.

3·20 The second serious problem is one of parked vehicles at the kerb. This is a danger for cyclists in any case, but it is almost certain that parking would need to be prohibited on roads where cyclelanes were to be established, causing immediate problems especially to commercial premises where kerbside servicing is the only possibility and on those residential roads where houses have no off-street car parking spaces. On other residential roads day to day deliveries, refuse collection and removals etc., also create difficulties.

3·21 It is possible, however, that in certain cases the cyclelane may be safer than the segregated cycletrack. These cases occur where there is the option of establishing a segregated cycletrack along a road, but where this has to rejoin the general carriageway at junctions, or of having a cyclelane. Some experience in Scandinavia suggests that the cyclist on the cycletrack is much more prone to accident at this merging point because other road users have got used to him not being present on the road. Similarly the cyclist may have been lulled into a false sense of security on the cycletrack and thus take less care when rejoining the traffic stream. In these circumstances the existence of a cyclelane serves as a constant reminder to other road users of the cyclist's existence, and the cyclist also takes normal care.

3·22 Despite the problems noted in 3·19 and 3·20 it is thought that the cyclelane principle may have some application to the Cambridge situation and should be incorporated into network proposals with a view to the introduction of experimental sections in suitable places.

Kerbside Parking.

3·23 The problems for cyclists of other vehicles parked at the kerb was briefly mentioned in para 3·20. Except at junctions where the cyclist is turning right or avoiding a left filter, he tends to ride near the kerb. The presence of a parked vehicle causes him to have to change lanes. This is a dangerous manoeuvre in that it requires him to be aware of following traffic, which is not always easy; to estimate the closing speed of any approaching vehicle and the distance consequently available to him to complete his lane change. Similarly the car driver has to have some estimation of the cyclist's speed etc., and whether he will need to take some avoiding action. Altogether this is a situation fraught with accident possibilities to which must be added the danger that the occupant of the parked vehicle may open his door without looking just as the cyclist is passing and knock him off his cycle or make him veer to the right into the path of another vehicle. Whilst this whole situation appears to account only for a small percentage of accidents it must cause concern and frustration to cyclist and other road user alike.

3·24 The only way of avoiding the situation, where segregated cycle-tracks are not possible, is to prohibit kerbside parking. Further study of this should be undertaken to see where such prohibitions are practicable, perhaps on a limited time period, by the use of clearways.

Alternative Routes on Minor Roads.

3·25 Another method of giving the cyclist priority is to create a series of alternative routes utilizing quiet streets rather than main roads, and possibly to discourage other users on these streets by restriction to access only.

3·26 This system has been worked out in some detail in Nottingham where a complete network has been mapped out and suggestions put forward for the arrangement of such streets. This involves reserving the crown of the road for cyclists with other users allowed access only by using the nearside lane and turning left at each junction. Portsmouth has also worked out such a system but it has yet to be implemented.

3·27 There are several problems associated with the implementation of priority street networks. Firstly, there is some doubt whether cyclists will use alternative networks unless they offer substantial advantages over existing main routes. This is particularly so where the alternative is tortuous or to any extent longer than the main road. Secondly, the Nottingham type priority street is only physically possible on streets in excess of 8·2 metres. Thirdly, restrictions on other road users may be unacceptable in lightly trafficked side roads where there does not appear to be a major problem at present.

3·28 The application of a priority street network to Cambridge would appear to be limited. The existing pattern of side streets does not fit, in general, with the indicated demand for cycle movement in that few side streets run parallel with the main radial routes where this movement is concentrated. The method, however, should be studied further to see whether some elements could be applied to the City, and further, where some small linkages between secondary streets might offer possibilities.

3·29 Another method of helping the cyclist on such a system without specific reservation of parts of the street is to establish lower speed limits for other vehicles on such streets, probably in the 15-20 m.p.h. range, a speed compatible with cycling speeds. However, national policy has never favoured speed limits lower than 30 m.p.h. and if anything the trend has been towards an increase. It is unlikely that a reduced speed limit would be approved and certainly it would be abused even if it were.

4. THE PROBLEM OF JUNCTIONS.

4·1 Common to all these alternatives is the problem of catering for the cyclist at junctions. It has been stated earlier in this report that the majority of cycle/car accidents occur at junctions, and when one considers the number of potential points of conflict between straight-through and turning traffic, the weaving necessary to make right turns, the differential speeds of cyclists and cars, the general absence of bells, reflectors and proper lighting fittings, the instability of cyclists at low speeds, their relatively poor acceleration, difficulties of judgement and difficulties of peripheral vision, it is remarkable that many more accidents do not occur.

4.2 Unfortunately, although a considerable amount of research has been carried out in this country, in Europe and in America on this problem, no really satisfactory answers have been produced except for a total segregation of cyclists and other vehicles.

4.3 The most desirable solution is to provide under-passes at junctions with bridges as a second and less desirable alternative. To be practical, the following design criteria need to be used:-

Underpasses. 2 directions:	Cyclist riding.	Slope 1.20. Width 6 metres.
Underpasses. 2 directions:	Cyclist walking.	Slope 1.10. Width 3.6 metres.

(Note. these criteria are based on the assumption that the underpass would be shared by pedestrians).

4.4 It should be stressed that the provision of such expensive facilities does not guarantee their use unless they are very convenient for cyclists and alternative surface routes effectively prevented from being used. This is difficult to achieve in existing situations.

4.5 Diagram 5 shows three possible alternative designs for a single two direction underpass for two way cycle traffic. It is very difficult to cater for turning movements with a segregated underpass. Experience with the Roundabout at the southern end of Elizabeth Way also shows the danger to pedestrians of cyclists using ramps. Better visibility and control is necessary, ie., a much more elaborate structure. The cost of providing grade separation is very high, and this alone rules out its general application on any network. There may be some locations, however, where these high costs can be justified in terms of heavy usage and greatly increased safety although generally the space required and effect on underground services will restrict the possibilities even if money is available.

4.6 Given that the widespread use of grade separation is not a practical proposition, it remains to study whether any other possibilities exist to improve the situation, even though potential conflict cannot be eliminated entirely.

4·7 Other potential methods of helping the cyclist are:-

a) By the provision of further pedestrian crossings such as zebra or pelican crossings. It must be remembered, however, that the Department of the Environment have established criteria for the provision of pelican crossings and their authorisation is needed. Furthermore, it is established practice to site pedestrian crossings away from actual junction points so that in some cases it may well be incovenient for cyclists to use them.

b) By the provision of further island refuges at roundabouts and 'T' junctions where cyclists crossing streams of traffic can have a protected place to wait.

c) By the installation of traffic signal control at heavily used junctions.

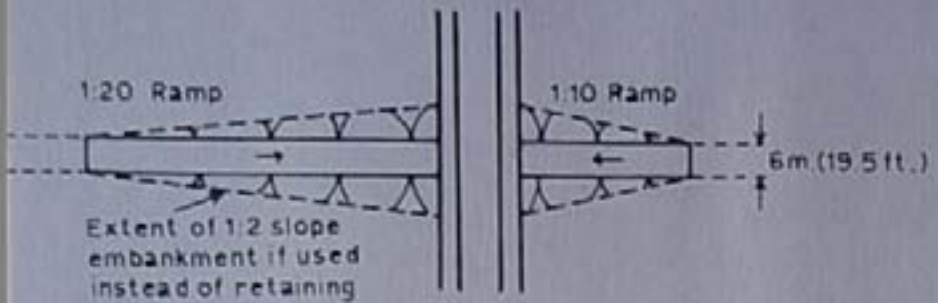
d) By giving the cyclist special provision at traffic signals. Again it should be stressed that no legal powers exist at present to allow a cycle priority phase at traffic signals.

e) By the provision of special road markings derived from the box junction system. This approach is not considered to be practical and may well create additional difficulties for the cyclist.

4·8 In general terms, however, there are also difficulties that arise, not because of physical contraints, but because of legal problems. The law sees the bicycle as a vehicle and thus does not at present allow specific solutions to be put forward which deal with cyclists alone. A national approach to this problem is needed. It may be that as the premier cycle City, Cambridge could co-operate with the Department of the Environment, who are not actively studying the problem at present, in promoting experiments which could improve the lot of cyclists.

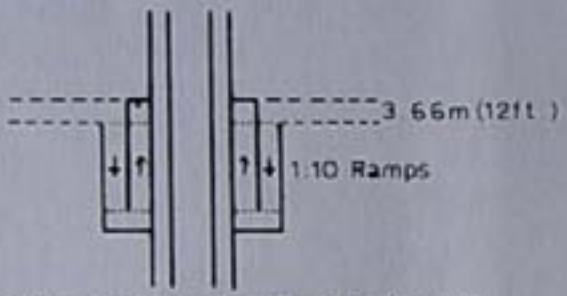
5. THE CYCLE NETWORK FOR CAMBRIDGE.

5·1 THE PREFERRED NETWORK shown on MAP 1 was based on the analysis of the present situation in Cambridge which is described in Section 2 of this report, and has been used as the basis for technical evaluation in order to arrive at a plan for cycle provision in real terms.

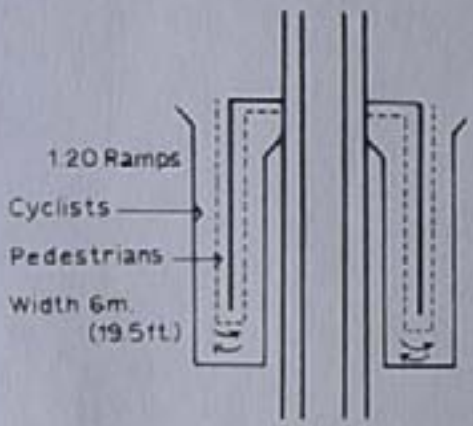


Note With 1:10 ramp the subway need only be 3.66 m (12ft.) wide as cyclists would have to dismount

Cycle/Pedestrian Underpass.



Cycle/Pedestrian (walk through) Underpass.



Note If space permits, could use banks instead of retaining walls around outer perimeter of ramps

Cycle/Pedestrian Underpass.

Alternative Underpass Designs

Diagram 5

Scale: 1:1250

5·2 The first step in this evaluation process was to produce a THEORETICALLY POSSIBLE CURRENT NETWORK as shown on MAP 2. The following assumptions were made:-

a) All the roads shown on the preferred network were measured, and lengths of road were deleted where there was physically insufficient room within the highway for the provision of cycletracks or cyclelanes.

b) All deleted road lengths were studied to see where it would be possible to introduce traffic management and restraint measures which would aid the cyclist.

c) Traffic management and restraint measures were omitted from those roads where their introduction would have a serious effect on the working of the total transportation network, these being primarily the major radial roads and the inner ring.

d) Traffic management and restraint measures introduced on other roads where in theory there would be no significant effect on the total transportation network.

e) No account was taken at this stage of conflicts with other road users, except on the primary roads((c) above).

5·3 Three main factors emerge:-

a) A comprehensive segregated network for cyclists is not possible.

b) There is little possibility of providing facilities on some parts of the major road network.

c) A large section of cycle network could only be achieved by traffic management measures.

5·4 This theoretically possible current network was then re-evaluated and an assessment was made of the likely impact of the proposals on the current level of congestion. The following assumptions were made:-

a) That it is undesirable to significantly increase current levels of congestion.

b) That congestion should not be created in areas where none exists at present.

c) That short sections of segregated cycletracks and cycle-lanes are not useful and should thus be deleted.

On this basis a CURRENT PRACTICAL NETWORK was produced as shown on MAP 3.

5·5 The main features of this network are:

a) The limited provision which can be made in the short term.

b) The difficulty of catering for cyclists on some of the most heavily used routes.

c) The need for providing alternative routes for traffic currently using parts of the total network in order to make space available for cycle provision.

5·6 The last stage in the evaluation process was to produce a longer term plan on the assumption that the by-passes and other relief roads which are committed at some stage in the road programme for the City will be built. On this basis the LONG TERM NETWORK was produced as shown on MAP 4.

5·7 The main feature of this network is the significant increase in the possible amount of cycle provision, especially on the eastern side of the City.

5·8 For the sake of clarity MAP 5 shows those parts of the preferred network where no provision can be made.

5·9 Maps 3 and 4 also show those places where junction improvements can be implemented in the short and long terms, given the provisos stated in paragraphs 4·7(a) and (d).

6. OTHER MATTERS

Cycle Parking.

6·1 It is essential that the cyclist should have adequate provision for parking his cycle at his destination. A separate technical paper has been prepared on this subject and can be made available for study. Its general conclusions, however, are that further provision is necessary in certain parts of the central area and at other key destinations in the City; that the V-grip type of cycle rack is preferable and should be used wherever new racks are provided; that long term parking racks should be covered wherever possible (e.g.

Preferred Network

Map 1

Key:

- Existing paths
- Major cycle routes
- Minor cycle routes
- Areas through which it is safe to cycle
- Right of way safeguarded
- Existing central area traffic scheme

Scale:

Theoretically Possible Current Network

Map 2

Key:

- Existing paths
- Cycle tracks
- Cycle lanes
- Traffic restraint
- Areas through which it is safe to cycle
- Existing central area traffic scheme
- Right of way safeguarded

Scale:

Current Practical Network

Map 3

Key:

- Existing paths
- Cycle tracks
- Cycle lanes
- Traffic restraint
- Areas through which it is safe to cycle
- Existing central area traffic scheme
- Right of way safeguarded

Junction Proposals

- Renewed
- Modified
- Unaltered
- Traffic lights
- Underpass
- Pedestrian crossing
- Island refuges
- Access restrictions favouring cyclists

Scale

Long-term Network

Map 4

Key:

- Existing paths
- Cycle tracks
- Cycle lanes
- Traffic restraint
- Areas through which it is safe to cycle
- Existing central area traffic scheme
- Right of way safeguarded

Junction Proposals

- Renewed
- Modified
- Unaltered
- Traffic lights
- Underpass
- Pedestrian crossing
- Island refuges
- Access restrictions favouring cyclists

Proposed roads

Scale

Impracticable Parts of the Preferred Network

Map 5

Key:

- Existing paths
- Major cycle routes
- Minor cycle routes
- Existing central area traffic scheme
- Areas through which it is safe to cycle
- Major cycle routes without provision
- Minor cycle routes without provision
- Right of way safeguarded

Scale

at the Railway Station); that provision should be made for cycle parking in all new commercial and industrial developments (best achieved by additional conditions on the planning consent).

6·2 In addition, Appendix 3 deals in detail with a policy for cycle parking including the improvement of existing facilities and proposals for a substantial increase in the number of cycle parking places at key destinations in the City.

Maintenance of Existing Cycleways.

6·3 It is important to remember that cycles, even modern ones, do not have good ride characteristics on bad surfaces. Consequently, it is important that existing paths used by cyclists should be regularly inspected and maintained to ensure the smoothest surface possible, free especially from potholes etc. It must be remembered, however, that there are only limited funds available for maintenance.

Maintenance for Carriageways.

6·4 Where the cyclist is using the existing carriageway he is normally cycling close to the kerb. It is therefore necessary to ensure that the carriageway surface at this point is as smooth as possible. Problems arise where resurfacing the carriageway leaves an uneven edge, recessed gulley covers and the like. Yellow lines which have been relaid several times can also create longitudinal bumps in the channel which can be dangerous for cyclists.

7. CONCLUSIONS AND RECOMMENDATIONS.

7·1 The most effective way of improving conditions for cyclists in the City is to proceed with plans for the construction of relief roads. At present the absence of alternative routes makes it very difficult to impose measures of restraint on traffic approaching the City centre. Stage 2 of the City Centre traffic experiment clearly indicated the problems. Other traffic management measures, such as the introduction of bus and cycle lanes on the Inner Ring Road and Inner Radial Roads would almost certainly lead to similar problems with opposition from the general public. A policy which clearly attempted to balance the introduction of restraint in the central parts of the road network with the provision of alternative routes further out is likely to be more acceptable.

7·2 The Stage 1 experimental traffic measures in the Central Area have created much better conditions for cyclists, and if a permanent Order is approved, little further needs to be done in this area. The only exception to this is an investigation of contraflow cycle lanes in Downing Street/Pembroke Street and Park Terrace.

7·3 The most serious problem is the provision of safer cycling at junctions where the cyclist is most in danger, but this is the most difficult problem of all to solve, given existing legislation and constraints of both existing forms of adjacent development and limited financial resources.

7·4 No single system of cycletracks, cycleways or priority streets can produce a total network covering the City. Furthermore, the proposed network must be a combination of different systems.

7·5 The amount of money available over the 15 year period in the Transport Policies and Programmes document is limited and must be used wisely to bring the greatest benefit in areas of greatest need.

IT IS RECOMMENDED THAT:

7·6 The cycle network outlined in MAP 3 be accepted as the overall target for implementation wherever possible by 1981.

7·7 The cycle network outlined in MAP 4 be accepted as the long term target for implementation in conjunction with the various relief road proposals and as soon as financial resources permit.

7·8 An approach be made to the Department of the Environment offering Cambridge as a suitable City for research and experimental schemes aimed at improving conditions for cycling in cities.

7·9 An early start be made on the implementation, after necessary detailed plans have been drawn up, of the following elements of the network as shown in MAP 3.

a) Implementation of a priority route for cyclists from Arbury and King's Hedges Estates to the City Centre via Carlton Way, Stretton Avenue, Hilda Street or Searle Street, Carlyle Road and Jesus Green.

b) Experimental cyclelanes on Huntingdon Road.

c) Possible inclusion of priority for cyclists in redesigning Murkett's Corner with traffic signal control.

d) Possible priority for cyclists at the Coldham's Lane/ Newmarket Road traffic signals after the dualling of that section of Newmarket Road.

e) Contra flow lanes in Park Terrace and in Downing Street/ Pembroke Street on the completion of redevelopment in Downing Street.

f) Creation of a cycle priority route through the St. Matthew's and Hills Road/Mill Road areas in conjunction with traffic management schemes at present under consideration.

g) Provision of cycle and pedestrian access to the Grove School from Hawkins Road.

7·10 A review of the condition of all existing paths used by cyclists be carried out with a view to producing a work programme for surfacing or resurfacing them and modifying as necessary or appropriate any items of furniture of inconvenience to the cyclist but bearing in mind the environmental setting.

7·11 A detailed investigation of all existing pedestrian bridges over the river be carried out with a view to adapting them for easier use by cyclists.

7·12 The provision of additional cycle parking places suggested in Appendix 3 be put in hand as soon as the necessary finance is available and any legal and land acquisition details have been overcome.

7·13 After the necessary research, a standard for the provision of cycle parking spaces in new developments be adopted by the Council.

7·14 Priorities for implementation of those parts of the network not included in 7·9 be established on the basis of need.

APPENDIX 1.

Analysis of Accident Figures.

1. Data Source.

The data which are provided by the County Council refer to reported accidents in Cambridge over the years 1971-73 and the first quarter of 1974. From these the City Engineer and Surveyor's department plotted accidents involving cycles and mopeds separately and the latter have been used for the bulk of this analysis, apart from Section 4, Causes of Accidents.

2. Number of Accidents.

Over the 3·25 year period there were 539 accidents involving cyclists. These constituted 30·4% of the accidents recorded in the City. The 129 moped accidents accounted for 7·3% of the total.

The basic figures are given in Table 2·1.

TABLE 2·1. Accidents Involving Cycles in Cambridge 1971-March 1974.

	1971	1972	1973	1st Quarter 1974	Total
Cycle Accidents.	163	167	157	52	539
Moped Accidents.	30	44	47	8	129
Total Accidents.	486	568	586	132	1,772
Cycle as % Total.	33·5	29·4	26·8	39·4	30·4
Moped as % Total.	6·2	7·7	8·0	6·1	7·3
Moped & Cycle as % Total.	39·7	37·1	34·8	45·5	37·7

3. The Location of Accidents.

The location of accidents plotted on a map of the City shows concentrations of accidents at junctions and along many of the main radial routes. In fact, 70·5% of cycles and 65·2% of moped accidents occur at junctions. Diagram 4 of the main text shows those junctions where 3 or more accidents have occurred in this period and these junctions are analysed in Table 3.1. The junctions analysed accounted for 44% of the total junction accidents recorded; the top ten alone accounted for 28%. The most dangerous junctions are close to the city centre or associated with the inner ring, giving a reasonable correlation with the heaviest traffic flows.

TABLE 3·1.

Major Cycle Accident Junctions.

LOCATION.	Accident.		Junction Type.						Control.			
	Cycle.	Moped.	Roundabout.	T-Junction.	Y-Junction.	X-Junction.	Offset X Junction.	Complex Junction.	Signals without Filter.	Signals with Filter.	Warden or Police.	None.
Histon Rd/Victoria Rd/ Huntingdon Rd/Mount Pleasant.	17							☆				*
Northampton St/Madingley Road/ Queen's Road.	11				*							*
Elizabeth Way/Newmarket Rd/East Rd.	11	2	☆									*
Hobson St/Sidney St/St. Andrew's Street.	11	3			*							*
Emmanuel Rd/Parker St/Drummer St.	11			*								*
East Rd/Mill Rd/Gonville Place/ Parkside.	11		☆									*
Emmanuel St/St. Andrew's St.	10	2		*								*
Four Lamps.	9	2	☆									*
Hyde Park Corner.	7	2				*				☆		
Cherry Hinton Road/Hills Road.	7				*					*		
Elizabeth Way/Milton Rd/ Highworth Avenue.	5	2	☆									*
Burleigh St/Norfolk St/East Road.	5					*						*
Fen Causeway/Newnham Road.	4		☆									*
Market Street/Sidney Street.	4			*							*	
St. Barnabas Rd/Gwydir St/Mill Rd.	4					*						*
Cherry Hinton Rd/High St/ Fulbourn Road/Queen Edith's Way.	4						*		*			

/Continued.

TABLE 3·1 Continued.

LOCATION.	Accident.		Junction Type.						Control.			
	Cycle.	Moped.	Roundabout.	T-Junction.	Y-Junction.	X-Junction.	Offset X Junction.	Complex Junction.	Signals without Filter.	Signals with Filter.	Warden or Police.	None.
Regent St/Park Terrace.	4			*								*
Burrell's Walk/Grange Rd/Adams Rd.	3						*					*
Histon Rd/Akeman St/Windsor Rd.	3						*					*
Stretten Av/Victoria Rd/St. Luke's Road.	3					*						*
West Road/Queen's Road.	3			*								*
Castle St/Northampton St/ Magdalene St/Chesterton Lane.	3					*				*		
Carlyle Rd/Chesterton Rd.	3			*								*
Northfield Ave/Campkin Road.	3			*								*
Silver St/King's Parade.	3			*								*
Covent Garden/Mill Road/ McKenzie Road.	3						*					*
Perne Rd/Cherry Hinton Road/ Mowbray Rd.	3		*									*
Bridge St/St. John's St.	3				*							*
Total:	168	13	43	41	32	22	13	17	6	17	4	143
Average:	6·0	2·2	7·2	5·1	8·0	4·4	3·2	17·0	4	5·7	4·0	6·2

Additional junctions with two or more moped accidents.

Young Street/East Road.	(2)
Emmanuel Street/Drummer Street.	(3)
Benson Street/Huntingdon Road.	(2)
Gilbert Road/Histon Road.	(2)

The examination of Table 3·1 shows that, on average, the most dangerous type of junction is the complex junction like Murkett's Corner, followed by roundabouts and 'Y' junctions. However, the deciding factor appears to be the junctioncontrol type, with traffic signals or warden control resulting in fewest accidents and uncontrolled junctions averaging the most cycle accidents.

Causes of Accidents 1971-March 1974.

Type.	Group.	% Total.
	A. Drivers and Cyclists.	
2	Turning Right Without Due Care.	18·4
3	Misjudged Distance, Clearance or Speed.	9·0
5	Emerging from Side Road, Service Road, Driveway without Due Care.	8·7
6	Other Error of Judgement or Negligence.	7·7
8	Driver Opening Side Door Negligently.	5·2
9	Losing Control.	5·2
10	Overtaking Improperly on Offside.	4·8
11	Inattentive or Attention Diverted.	4·0
12	Turning Left without Due Care.	3·7
13	Crossing without Due Care at Road Junction.	3·3
14	Failing to Comply with Traffic Signal/ Sign.	2·7
15	Following too Close Behind other Vehicle.	2·4
16	Swerving.	1·7
17	Overtaking Improperly on Nearside.	1·6
18	Failing to Keep to Nearside or Proper Traffic Lane.	1·0
19	Cutting In.	1·0
20	Reversing Negligently.	1·0
22	Inexperience with type of vehicle in use at the time.	0·8
23	Under the Influence of Drink or Drug.	0·6
24	Learner Driver.	0·6
25	Pulling Out from Nearside without Due Care.	0·6
26	Hampered by Passenger, Animal, Luggage, in or on any Vehicle.	0·6

/Cont.

Causes of Accidents 1971-March 1974 /Continued.

Type.	Group.		% Total.
27	Moving Off without Due Care.		0·6
28	Failing to give Free Passage at Pedestrian Crossing.		0·5
30	Changing from one Traffic Lane to another without Due Care.		0·5
32	Negligently Opening Rear Door.		0·5
33	Failure to Signal, Indistinct or Incorrect Signal.		0·3
34	Pulling Out from Offside without Due Care.		0·3
36	Cyclist Riding with Head Down.		0·3
37	Ill.		0·2
38	Turning in road Negligently.		0·2
39	Dazzled by Lights of other Vehicles.	Sub Total	0·2 88·3%
	B. Pedestrians.		
40	Slipping, Walking, Running into Roadway.		3·3
41	Crossing road, masked by Stationary Vehicle.		1·0
42	Crossing road not masked by Vehicle.		0·5
45	Crossing road, masked by moving Vehicle.	Sub Total	0·3 5·1%
	C. Passengers.		
54	Opening door without Due Care.	Sub Total	1·3 1·3%
	D. Animals.		
59	Dog on Carriageway.	Sub Total	0·2 0·2
	E. Obstructions.		
63	Other Obstructions in Highway.	Sub Total	0·5 0·5%
	F. Vehicle Defects.		
64	Defective Brakes.		0·6
65	Other Failure of Vehicle or Equipment causing accident.		0·5
69	Inadequate or no Front Light.		0·3
74	Defective Tyres or Wheels.	Sub Total	0·2 1·6%

/Cont.

Causes of Accidents 1971-March 1974/Continued.

Type.	Group.		% Total.
	G. Roads.		
77	Wet and Greasy road surface.		0·6
79	View Obstructed by road layout or by Objects off carriageway.		0·2
80	Slippery road surface due to factors other than weather.	Sub Total	0·2 1·0%
	H. Weather.		
84	Glaring sun.		0·5
86	Strong wind.	Sub Total	0·2 0·7%
	I. Other Factors.		
87	Cause not traced.		1·0
88	Any cause not included in A. to H. above.	Sub Total	0·6 1·6
		TOTAL:	100·2%

Junctions are particularly dangerous. The largest single cause of accidents was turning right without due care 18·4%, but in only 35% of the total cases was negotiating a particular junction or obstacle the main cause of the accident (type 2, 5, 12, 13, 30, 79). The remaining 65% were due mainly to negligence and errors (which may have occurred at junctions) which cannot be eliminated by any form of control that might be instituted. While a strong campaign for road safety could help, the segregation of cyclists and other vehicles would be of considerable assistance for types 3, 10, 15, 16, 17, 18, 19, 36, 38, i.e., in about 22% of accident cases.

APPENDIX 2.

COMPARISON WITH OTHER TOWNS.

1. Stevenage.

Twenty three miles of cycleways together with 90 underpasses have been constructed to segregate cyclists from cars. The facility is shared with mopeds and pedestrians and runs alongside main roads separated by grass verges from carriageways and footways. In addition there are a number of cross town cycle links which run independently of roads, some of which were originally country lanes.

In terms of usage in 1966 10·1% of the working population cycled to work and by 1971 only 9% cycled to work. In terms of school trips 8·4% cycle daily to primary schools within easy walking distance, and 17·4% cycled to secondary schools in 1971. The decline in usage in recent years has matched the increases in car ownership although recent increases in fuel prices may reverse this trend.

2. Peterborough.

About a mile and a half of purpose built cycleways in the new township of Bretton have so far been constructed. A 38 mile system of main routes is planned linking the city centre with existing built up areas, the new townships, the Nene park and extending into surrounding countryside. In addition 34 miles of secondary routes or local links are proposed providing routes within local areas feeding cycle traffic to and from the main routes.

The proposal consists of segregated cycle tracks, cycle lanes on roads, 'cycle priority' streets and cycle trails into surrounding countryside. Pedestrian ways are to be separated from contiguous cycle routes.

In 1966 36·9% of the working population living and working within the Local Authority area cycled to work. Unfortunately no data are yet available for 1971.

3. Harlow.

A network of segregated cycleways has been established in Harlow based on old lanes with a few new links. The network now measures over 7 miles. Routes run through the heart of housing areas where cyclists use spine and estate roads. Segregation is provided by underpasses under main roads with some surface corssings. Foot-paths are generally segregated from cycleways.

As elsewhere, a decline in the use of cycles for journeys to work has been experienced in recent years. In 1966 14·3% cycled to

work whereas in 1971 only 0·9% cycled to work within the Local Authority area. A more recent count in 1973 indicated a slight reversal in this trend.

4. Nottingham.

A network of 'cycle priority streets' has been proposed which utilises selected access roads that are at present lightly trafficked. These run through the heart of existing environmental areas providing reasonably safe, convenient, pollution free routes linking key origins and destinations.

It is suggested that these take the form of a cycleway, marked and signposted, along the centre of the road with access for vehicles maintained by left turn only. Thus a vehicle would join the priority route by turning left out of a side road and leave by the next side turning to the left. Stationary motor vehicles would need to be controlled so as to maintain access to premises and prevent encroachment upon the priority route.

Crossing places are to be maintained for essential traffic at half mile intervals with vehicular traffic giving way to cyclists on the priority route.

At major junctions traffic signals are suggested with an extended green phase for the priority route.

The proposals prepared for the Corporation on behalf of Raleigh Industries have not at yet been adopted or implemented.

In 1966 4·1% of all trips to work were by cycle in the City.

5. Oxford.

Oxford have introduced an experimental scheme comprising bus and cycle lanes along main radial roads and two contra flow cycle lanes in the central area. The bus and cycle lanes are operational during the day, whereas the contra flow lanes are operational 24 hours a day.

No measures have been adopted to assist cyclists at junctions although the contra flow lanes are part of a traffic management scheme in the central area.

The bus lanes are shared by cyclists whereas the contra flow lanes are for the exclusive use of cyclists and are consequently narrower.

The experimental period has nearly expired and no decision has been made as to the future. Doubts are expressed also concerning the legality of contra flow lanes, although the system appears to be working satisfactorily.

In 1966 23·2% of all journeys to work in the Local Authority area were made by cycle according to the 1966 Sample Census. This figure had dropped, as elsewhere, by 1971 but no accurate figures are available.

6. Norwich.

A comprehensive network of segregated cycle tracks and footpaths is programmed for construction from 1975 onwards in the Bowthorpe area of Norwich as part of a city housing expansion scheme. They are to be based upon paths radiating from the main centre and are segregated at road intersections by underpasses. The footpaths and cycle tracks are to be physically separated by a change in surface material. The network will link with access roads usually cul-de-sacs or joint vehicle-pedestrian areas such as mews courts.

The cycleway system at Bowthorpe will eventually be extended through adjacent residential areas towards the city centre.

A pedestrian and cycle underpass has recently been completed under the new inner ring road. A cycleway connects via a road with restricted traffic to the town centre. Future restraint of motor traffic in the town centre is planned.

In 1966 21·6% of all journeys made to work were made by cycle. By 1971 this percentage had dropped to 12·8%.

7. Cheltenham.

The building of a new by-pass near the Dowtry headquarters gave an opportunity to put in a cycleway leading from a new housing development to an employment area. The cycleway includes an underpass which incorporates a footpath on one side. The success of this scheme has persuaded the Local Authority to look at cycleway development throughout the town. A District Plan is currently being prepared for the central area which is investigating cycleway provision.

In 1971 only 5·6% of the working population cycled to work in Cheltenham, whereas in 1966 21·8% cycled to work in the municipal borough according to the 1966 sample census.

8. Daventry.

Six miles of cycleway routes and five subways have been provided. These consist of segregated tracks alongside primary roads and the use of local distributor and collector roads in the main residential areas. The use of the latter keeps cycles on the vehicular side of housing avoiding conflict with pedestrians. Heads of cul-de-sacs are linked by cycle paths where local distributor and collector roads do not form a viable network.

In 1966 4·4% of the working population cycled to work whereas in 1971 4·1% of the population cycled to work.

9. Swindon.

Two segregated tracks have been provided alongside a main road linking a housing area with an industrial area. Underpasses have been provided for cycle and pedestrian use. The tracks are about ½ mile in length.

In 1966 20% of the working population cycled to work. No data are available for 1971.

10. Thamesmead.

A five mile long cycleway system has been proposed in the plans for Thamesmead following study of other towns and the analysis of likely effects. The system is designed on the combined pedestrian/cyclist basis and is seen as an essential supplementary to the road system. The study considered the possibility of traffic regulations which would ban the use of major roads by cyclists. Upon detailed examination the necessary traffic regulations were found to be impractical.

11. Wandsworth.

A network is proposed consisting of cycle priority routes, contra flow lanes in some one way streets and an exemption of cyclists from banned turning movements. Cycleways are to be incorporated alongside riverside walkways and cycle tracks provided along the A3 through the borough. Cycle trails are envisaged for recreational cycling on commons.

The cycle priority streets are to be implemented as part of Wandsworth's Traffic and Environment policy and are to form a network in conjunction with short lengths of cycleway and cycle trails. They are to meet the main road network at a limited number of intersections. Some existing subways are to be adapted to enable use by cyclists. Light controls or pelicans are envisaged at major junctions. Parking facilities are to be provided in shopping areas and the railway authority are to be approached to provide adequate storage accommodation for cycles.

The needs of cyclists are to be considered in designing new housing estates with vehicular accesses to estates linked by cycleways.

In 1966 3·5% of all trips to work were by cycle whereas in 1971 only 2·0% cycled to work. Over 80% of school children over the age of 10 cycled to school in 1971.

12. Vasteras, Sweden.

A comprehensive cycleway system has been provided that runs directly to the heart of the town centre and is restricted to cyclists, pedestrians, buses and delivery traffic. Congestion has been reduced and it is estimated that the community saves nearly £100,000 per year in accident costs.

13. Holland.

Dutch cycleways constitute an excellent example of how to incorporate a system into an existing town. Over 76% of the population owns a bicycle. They are extensively provided with cycle facilities and their use is encouraged. Special cycle traffic lights give cyclists a five second advantage at busy road junctions.

14. U.S.A.

About 30% of the population own cycles and use them for commuting and recreation. Pressured by public demand the authorities have now provided segregated cycleways and other amenities for cyclists.

In Davis, California, 75% of residents own bicycles. The provision of cycleways and underpasses has ensured more confident driving and eliminated bicycle/car accidents. It has also reduced the need for drastic road redevelopment and reduced the pressure for further car parking space which in turn has helped to preserve the environment.

Washington has also provided a system of cycleways.

Town	% residents cycling to work in L.A.		Facilities Provided			Facilities Planned		
	1966	1971	Comprehensive	Partial	Comments	Comprehensive	Partial	Comments
Cambridge	36.5	30.0		/	Central area access restricted to certain classes of vehicle.			
Peterborough	36.9	25.1		/	½ mile of segregated cycle track in new township of Bretton.	/		38 mile main network and 34 mile local network of tracks, lanes, priority routes and trails. Further study of NB
Oxford	23.2	-		/	Cycle contraflow lanes in central area. Bus and cycle lanes on radials.			
Swindon	20.9	-		/	2 segregated tracks with underpasses; ½ mile in length.			
Norwich	21.6	12.8		/	Pedestrian and cycle underpasses under Ring Road.		/	Comprehensive network of tracks and footpaths planned for Barrthorpe area with links to City Centre.
Portsmouth	15.9	10.2					/	Limited network based on cycle priority streets.
Stevenage	11.7	9.0	/		23 miles segregated track with 90 underpasses based on primary network.			
Harlow	14.3	8.9	/		Underpasses & 7 miles of segregated track using primary network and old lanes. As in Stevenage use access roads in housing estates.			
Cheltenham	21.8	5.6		/	Cycle track and underpass between housing and employment areas in conjunction with new bypass.			

Town	% residents cycling to work in L.A.		Facilities Provided			Facilities Planned		
	1966	1971	Comprehensive	Partial	Comments	Comprehensive	Partial	Comments
Daventry	4.4	4.1			6 miles of cycle track and 5 subways based on primary network and use of residential estate roads as part of town expansion.			
Nottingham	4.1	-						Network based on cycle priority routes utilising selected access roads that are currently lightly trafficked. Local access only for vehicles by left turn only measure.
Wandsworth	3.5	2.0						Network based upon cycle priority routes, contra flow lanes, tracks and trails. Exemption from banned turning movements.
Thamesmead	-	-					/	5 mile cycle track system.

Excluding the Lion Yard this would provide for approximately 180 extra cycle racks within the City. At current prices this would cost roughly £400 for the racks above. The costs of installation and any other land acquisition which may be required, must be added to this sum. In certain cases agreement with private property owners would have to be reached before racks could be installed.

The preceding recommendations provide the basis for a short term programme of action. In the longer term the following are recommended for implementation:-

a) Negotiation with British Railways with a view to purchasing more land, to the north of the proposed new bus depot in Station Road, for covered cycle parking. Not less than 300 racks are required.

b) The provision of covered long term parking facilities in association with the Lion Yard and Park Street car parks.

c) The provision of further facilities within the Central Area and district centres as the funds become available and the need arises.

Private Parking Facilities.

All employers and places of commerce should be encouraged to provide adequate cycle parking facilities for their employees and customers. Although it would be difficult to compel individuals or institutions to comply with any request to provide such facilities on existing sites, the provision of cycle parking space should be inserted as a condition on any planning permission for new development. The following types of establishment should be dealt with in this way: schools, colleges, University establishments, offices, warehouses, industrial premises, major shopping developments and public halls. A short research programme should be undertaken to establish suitable standards.

APPENDIX 3.

CYCLE PARKING POLICY.

The programme of action should:-

a) Attempt to improve existing facilities.

b) Identify more parking space.

A. Improvements to Existing Facilities.

The following programme of action is recommended -

a) Regular cleaning and maintenance of racks which are of the slot type. Priority to be given to Rose Crescent, St. Mary's Passage and Mortimer Road (Parkside Pool).

b) The progressive replacement of unsatisfactory facilities (e.g. slotted block) by the more effective V-grip.

B. The Expansion of Cycle Parking Facilities.

More public and private racks should be provided within the City.

Public Parking Facilities.

Central area cycle parking facilities will be increased by over 100 metres on completion of the Lion Yard redevelopment. In addition a further 130-140 spaces could be provided in the localities indicated on Schedule I and Maps 1 and 2, A-F. In the cases where racks are proposed on the carriageway, or in existing car parking bays (locations 1, 2, 3, 4, 7, 8 and 9), it may be important to define the parking area by a raised kerb and/or bollard. In addition it may be necessary to mount the rack on the kerb in order to accommodate the cycle safely within the space available.

In order to accommodate the Drummer Street/Hilton Walk racks it would be necessary to widen the path by 0·5m, this would only involve the resurfacing of a worn grass area and could enable a clearly defined edge to be laid down. The Regent Terrace proposals would also involve the loss of some worn grass.

Outside the Central Area the main deficiency zones are Mill and Hills Roads, Mitcham's Corner and the Kite. The latter area must await the outcome of the proposed redevelopment. The schedule suggests some provision for the former three.

Excluding the Lion Yard this would provide for approximately 180 extra cycle racks within the City. At current prices this would cost roughly £400 for the racks above. The costs of installation and any other land acquisition which may be required, must be added to this sum. In certain cases agreement with private property owners would have to be reached before racks could be installed.

The preceding recommendations provide the basis for a short term programme of action. In the longer term the following are recommended for implementation:-

a) Negotiation with British Railways with a view to purchasing more land, to the north of the proposed new bus depot in Station Road, for covered cycle parking. Not less than 300 racks are required.

b) The provision of covered long term parking facilities in association with the Lion Yard and Park Street car parks.

c) The provision of further facilities within the Central Area and district centres as the funds become available and the need arises.

Private Parking Facilities.

All employers and places of commerce should be encouraged to provide adequate cycle parking facilities for their employees and customers. Although it would be difficult to compel individuals or institutions to comply with any request to provide such facilities on existing sites, the provision of cycle parking space should be inserted as a condition on any planning permission for new development. The following types of establishment should be dealt with in this way: schools, colleges, University establishments, offices, warehouses, industrial premises, major shopping developments and public halls. A short research programme should be undertaken to establish suitable standards.

SCHEDULE I.

Location of Proposed New Cycle Parking Facilities.

In all cases the level of provision is based on the V-grip type of rack set at either 90°, 45° or 25° to the plane of attachment. With the exception of Quayside (9) and Sussex Street (12) single spacing is recommended as this is more convenient for the user. At the cost of this convenience, more widespread use of the alternate raised head type rack would enable considerably more spaces to be provided.
The space between cycles for the various types of rack are as follows:-

90°	610mm
45°	610mm
25°	383mm

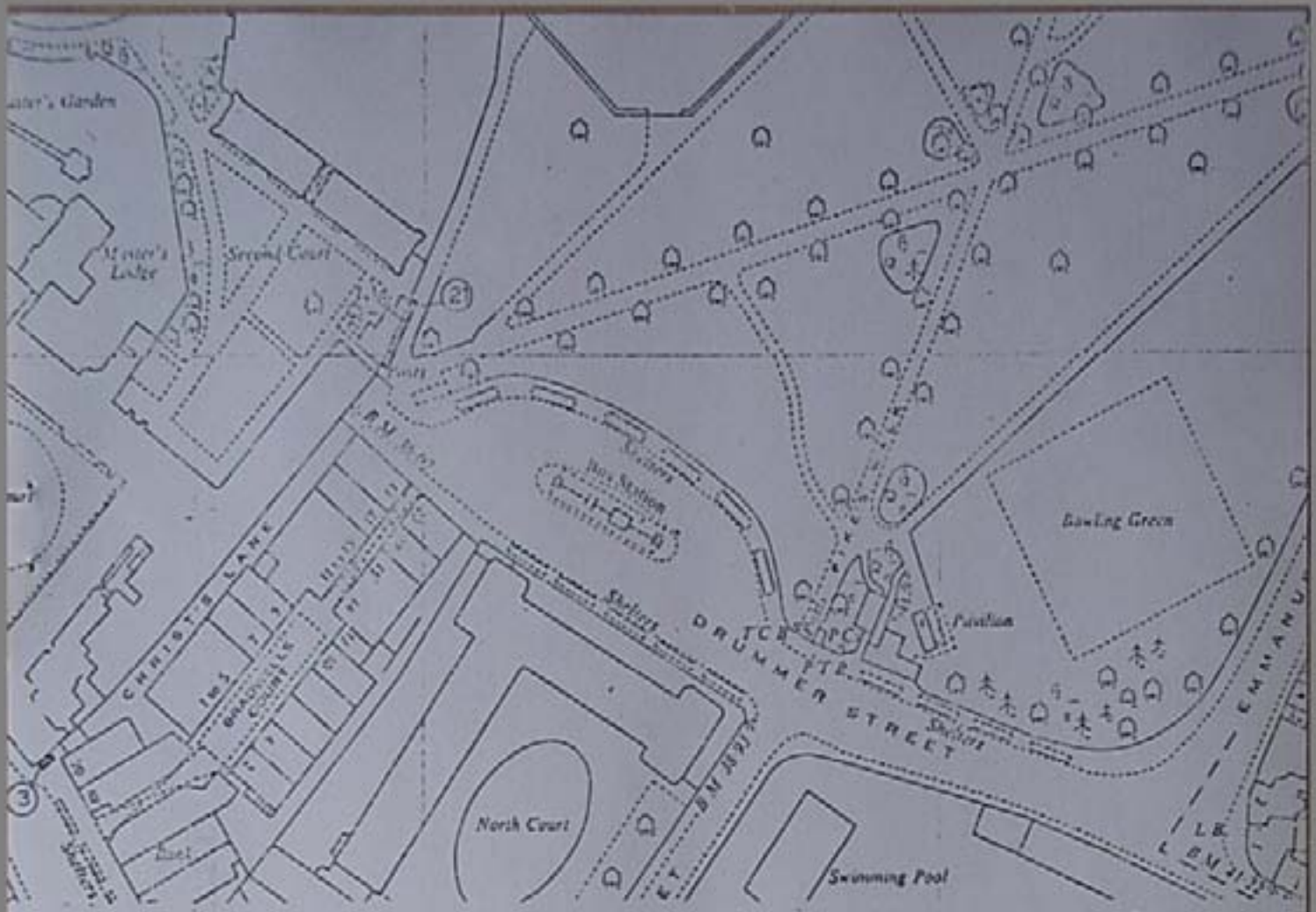
45° + 90° Alternate Raised Head 305mm.

Location.

	Central Area.	No. Racks.	Type.
1.	21-17, St. Andrew's St. (one parking bay, 4·8m).	9	90°
2.	2-10, Regent Street, (one parking bay, 4·8m).	9	90°
3.	Rear of Marks & Spencer, Hobson Street, (6m) and/or	11	45°
4.	Opposite No. 21, Hobson Street (one parking bay, 4·8m).	9	90°
5.	Drummer Street/Milton Walk (13·4m).	21	45°
6.	St. Andrew's Street/Christ's Lane (2·8m)	3	45°
7.	Sidney Street, Nos. 38-40 (12m).	19	45°
8.	40-41, Green Street (m/c bay 10m).	15	45°
9.	Quayside (4·6m between C.P. bays).	11	45° alternate raised head.
10.	Peas Hill (6·5m).	12	90°
11.	Regent Terrace (4·4m).	8	90°

	Location.	No. Racks.	Type.
	Central Area.		
12.	Sussex Street (replace 6·1m of single space with raised head racks).	10	90° raised head.
13.	Silver Street, side of Pitt Building. (3·3m).	6	90°
	Central Area Sub-Total:	132-134	
	Hill Road.		
14.	Inside Cemetery Gates (2 x 2·5m).	10	90°
15.	Library (2 x 2·5m)	8	25°
16.	Outside No. 163 (3·5m).	7	90°
17.	No. 182 (2m).	2	25°
18.	Corner site, entrance to No. 242 (2m).	3	45°
	Hill Road Sub-Total:	30	
	Hills Road.		
19.	Entrance to Claremont (c.4m).	6	45°
20.	Between Nos. 58 and 62 (2m).	4	90°
	Hills Road Sub-Total:	10	
	Hitcham's Corner.		
21.	Parking Space outside No. 20, Chesterton Road (2m).	4	90°
22.	Parking Space outside No. 46, Chesterton Road (2m).	4	90°
	Hitcham's Corner Sub-Total:	8	
	Grand Total:	180-182	

1. New Central Area Parking Facilities.


Bowling Green
Pavilion
DRUMMER STREET
North Court
Swimming Pool
CHRIST'S LANE

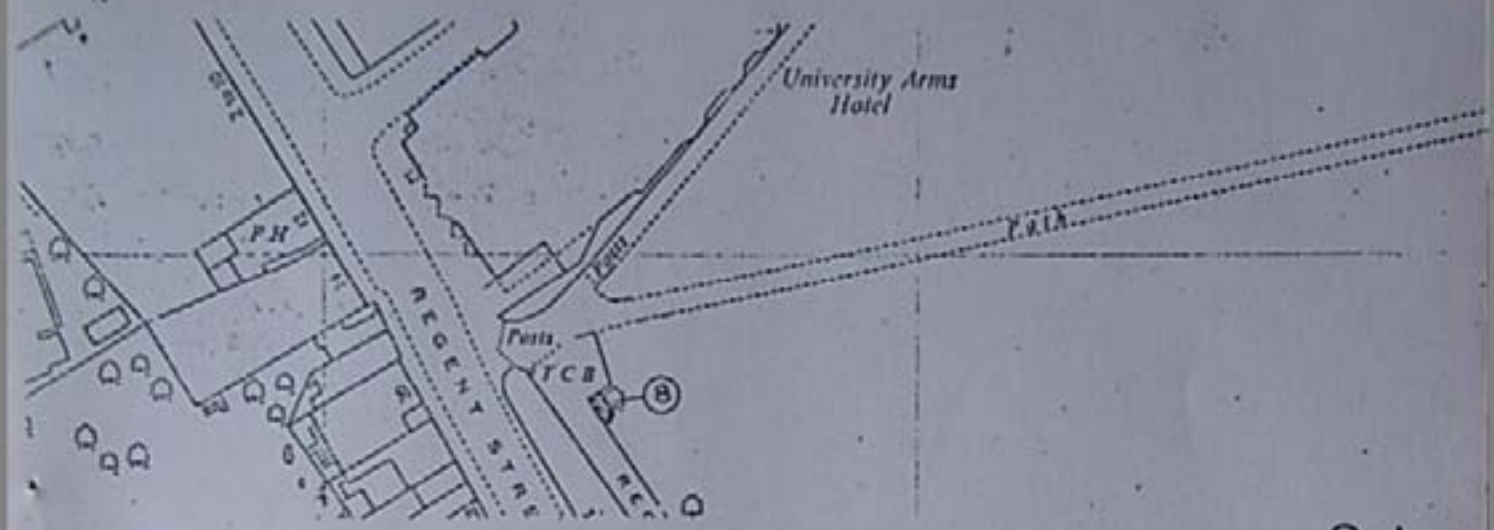
2a


Garage
QUAY SIDE
Great Bridge
MAGDALENE STREET
NEW PARK STREET

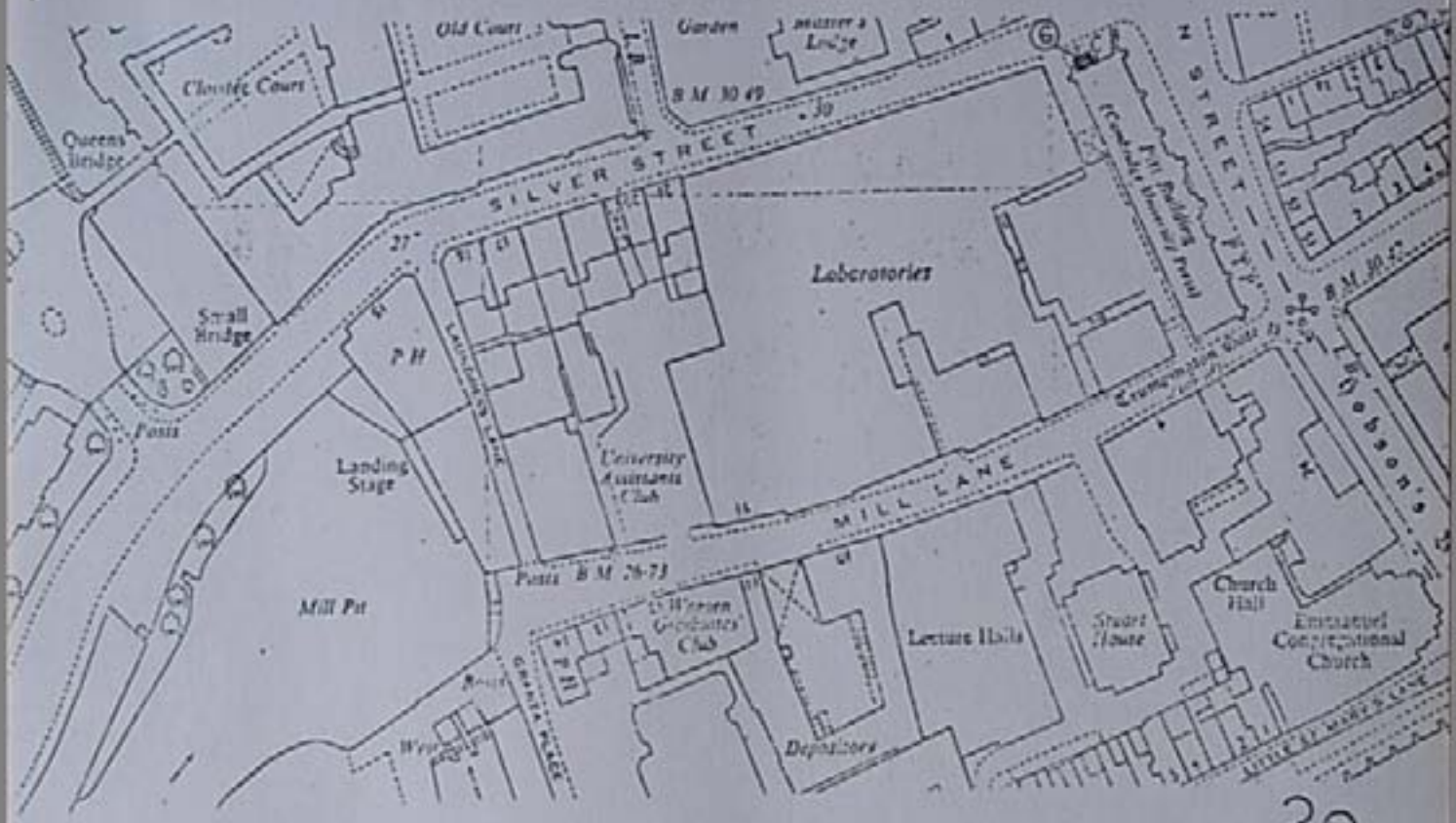
2b


MARKET HILL
Church of St Mary the Great
ST MARY'S PASSAGE
Market Hostel
Bank
Guildhall
GUILDHALL STREET
PETTY CURY
SENATE HOU

2c


University Arms Hotel
PH
REGENT STREET
Posts
TCB
8

2d


Old Court
Garden
Master's Lodge
Cloister Court
Queens' Bridge
SILVER STREET
BM 30.49
Laboratories
Small Bridge
PH
Posts
Landing Stage
University Assistants' Club
MILL LANE
Posts BM 28.73
Mill Pit
Lecture Halls
Student House
Church Hall
Emmanuel Congregational Church
Depositories
Hobson's
6

2e


County Hall
HOBSON
10

2f

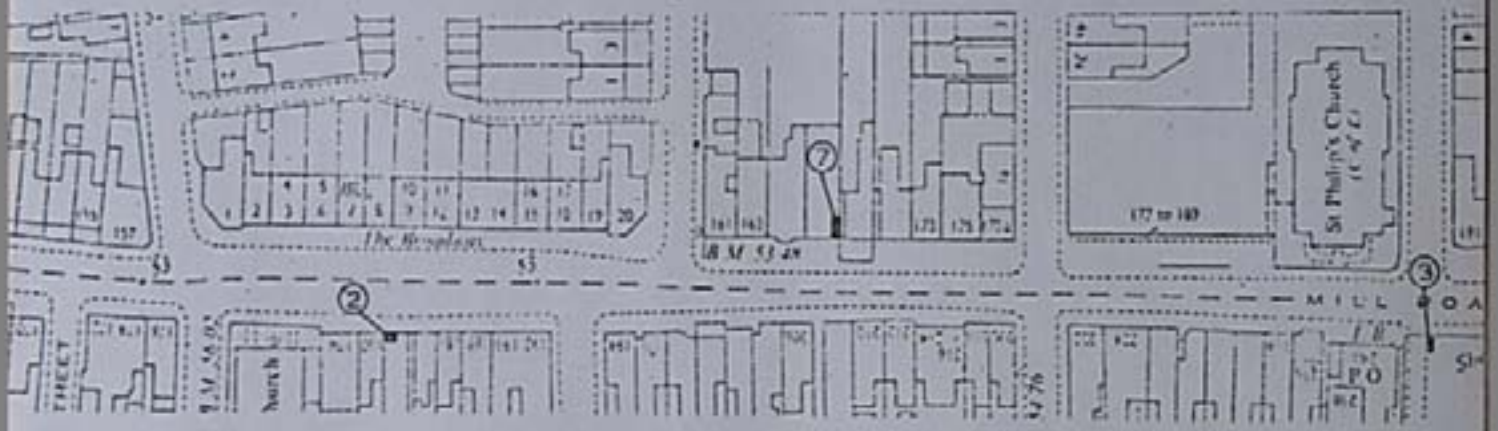
3 New District Centre Parking Facilities


Hughes Hall
PH
PO
5
5

4a


MILL ROAD
Library
Surgery
4
4

4b


St Philip's Church
MILL
PO
7
2
3

4c


PH
PO
PH
Mill Road Methodist Church
6
8

4d

APPENDIX 4.

SOURCES OF INFORMATION.

A. Cambridge Cycle Data.

1. Data produced by Travers Morgan and Partners for their Interim Report 'Travel in Cambridge' and their final report 'Cambridge Transportation Plan' was used extensively. Especially valuable were the Origin and Destination Tables for Surveyed Cycle Trips 1967 and Surveyed Cycle Assignment Network for 1967.

2. The pattern of cycle trip generation derived from the 1967 data was compared with 1971 Census data which confirmed that no radical changes in these patterns has occurred.

   The particular tables used were:-

   a) The 1971 Census, 10% Sample. Table of Mode of Travel to work, which included for each enumeration district the number of residents cycling to work.

   b) From the household statistics of the full census of 1971 the percentage in each enumeration district of households without a car.

3. Accident Figures for Cyclists over the years 1971, 72, 73 and the first quarter of 1974 (See Appendix 1).

B. Information on Cycleway Projects in Other Towns. See Appendix 3.

C. Information on Cycling in General and Generic Methods of Cycle Provision.

1. Terence Bendixson "Instead of Cars' published in 1974. In this both tried and proposed methods of cycle provision are reviewed including examples from other European countries and the U.S.A.

2. "Bikeways - The State of the Art" published in 1974 by the U.S.A. Department of Transportation. This closely reviews the effectiveness and design problems of cycle facilities which have been tried out in various States of America.

3. Cycling in Nottingham published for Nottingham Corporation by Eric Claxton which puts forward his proposals for a network of cycle priority streets.

4. Of the people talked to, especially helpful were Mr. Terence Bendixson and Mr. Quenault (of the Road Research Laboratory).