

MINISTRY OF TRANSPORT

Report of the Traffic Signs Committee

18th April 1963



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Contents

	<i>Paragraph No.</i>
TERMS OF REFERENCE	1
METHOD OF WORKING	2
SCOPE OF THE REVIEW	3- 5
SYNOPSIS OF PRINCIPAL RECOMMENDATIONS	6- 22
INTRODUCTION	23- 39
Present and Future Needs	23- 25
General Principles	26
Criticisms of Existing United Kingdom Signs	27- 28
Signing Systems Abroad	29- 32
Comparison of Systems	33- 35
Preference for 1949 Protocol System	36- 39
GENERAL DESIGN CONSIDERATIONS	40- 49
Lettering	40- 44
Colour and Shape	45- 48
Size	49
REVIEW OF SIGNS	50-256
A. Signs Giving Definite Instructions	51- 87
(a) Mandatory signs	51- 62
(b) Prohibitory signs	63- 82
(c) Waiting restriction and limited parking signs	83- 87
B. Warning Signs	88-129
C. Informatory Signs	130-191
(a) Directional signs	131-160
Origin of present system	132
The influence of motorway signs	133
Requirements of the Protocol	134
Criticisms of present signs	135
General changes advocated	136
The selection of Primary routes	137
Primary routes in urban areas	138
Colour of Primary route signs	139-140
Lettering	141
Variations in letter size on a single sign	142
Route numbers	143
Route symbols	144
Chequer symbol	145
The selection of place names on directional signs	146
Design rules for directional signs	147

Sign types	148
Standards of directional signposting	149
Advance direction signs	150
Local advance direction signs	151
Direction signs	152
Urban direction signs	153
Route confirmatory signs	154
Ring roads	155
Use of local junction names on directional signs	156
Place name signs	157-158
Footpaths and bridleways	159
Roads used as public paths	160
(b) Other informatory signs	161-191
D. Temporary Signs	192-208
(a) Signs required by obstructions on the highway	192-202
Road works	192-198
Accidents and emergencies	199-202
(b) Signs erected by the motoring organisations	203-204
(c) Signs erected by the police	205
(d) Signs erected by highway authorities	206
(e) Other temporary signs prescribed in the Regulations	207-208
E. Miscellaneous Signs	209-217
(a) Bollards	209-212
(b) Refuge indicator lamps	213
(c) Traffic cones	214
(d) Bus stop signs	215
(e) Street name plates and numbering of premises	216
(f) Signs indicating services in by-passed towns and villages	217
F. Authorised Signs	218-220
G. Carriageway Markings	221-244
(a) Types of marking	222
(b) Transverse markings	223-225
Broken white lines	224
Continuous white lines	225
(c) Longitudinal markings	226-230
The double white line system	226
Hazard warning markings	227
Lane lines	228
Edge of carriageway marking	229
Continuous yellow line	230
(d) Other markings	231-237
(e) Colour of markings	238-239
(f) Surface texture of markings and the use of steel studs and plates	240
(g) Higher standards of road marking	241-243
(h) Maintenance	244

	<i>Paragraph No.</i>
H. Traffic Signals	245-251
I. Pedestrian Crossings	252-256
The present position	252
Stud markings	253
Zebra markings	254
Beacons	255-256
OTHER CONSIDERATIONS	257-293
A. Illumination	257-263
B. Siting and Mounting	264-280
Distance and spacing	264-267
Height	268
Position in relation to the carriageway	269-272
Alignment	273-274
Method of mounting	275-276
Overhead mounting	277
Duplication of signs	278-279
Position of directional signs in relation to junctions	280
C. Three-dimensional Aspects of Sign Design.	281-282
Ministers' control	281
Appearance of the backs of signs	282
D. Materials for Sign Construction	283-284
E. Maintenance	285-290
F. Sign Clutter	291-293
ADMINISTRATION	294-305
A. General Considerations and Recommendations	294-300
B. Change-over to Recommended Signs.	301-304
C. Change-over Publicity	305
DETAILED SUMMARY OF RECOMMENDATIONS	
ACKNOWLEDGMENTS	
APPENDICES	
I. List of Organisations Consulted	
II. Illustrations of Recommended Signs	
III. Two Protocol Signs not Recommended	
IV. Standard Colours to be used for Signs, Posts and Fittings	
V. Table of Letter Heights for Directional Signs	
VI. Table of Sizes for Warning, Mandatory and Prohibitory Signs	
VII. Table of Siting Distances for Advance Direction and Warning Signs	
VIII. Rules for the Design of Road Signs	

TRAFFIC SIGNS COMMITTEE

REPORT

To the Rt. Hon. Michael Noble, M.P., Secretary of State for Scotland and the Rt. Hon. Ernest Marples, M.P., Minister of Transport.

Terms of Reference

1. We were asked to review traffic signs on all-purpose roads, as distinct from motorways, including roads in urban areas and to recommend what changes should be made.

Method of Working

2. We were appointed in December 1961. We held our first meeting in January 1962. We have held twenty meetings in all most of them lasting the whole day. These meetings included several journeys to inspect experimental signs which had been put up by the roadside in town and country. We have not worked through sub-committees but have been assisted by a Departmental Working Party which included representatives from the Road Research Laboratory. The Working Party studied in detail all sections of our field of work and submitted to us working papers which provided a most useful basis for our discussions. At the outset members of the Working Party visited Continental countries and were asked to put before us detailed comparisons of Continental and British practice. Without the help of the Working Party it would have been quite impossible for us to cover so complex a field in a little over a year.

Scope of the Review

3. We should begin by defining the meaning and explaining the implications of the terms 'traffic signs' and 'all-purpose roads'.

4. Traffic signs are defined in the Road Traffic Act 1960 as 'any object or device (whether fixed or portable) for conveying to traffic on roads, or any specified description of traffic, warnings, information, requirements, restrictions or prohibitions of any description specified by regulations made by the Minister and the Secretary of State acting jointly or authorised by the appropriate Minister, and any line or mark on a road for so conveying such warnings, information, requirements, restrictions or prohibitions'. They therefore include

not only roadside signs, but traffic signals, carriageway markings, 'catseyes' and indications on street bollards.

There are four classes of roadside traffic signs, mandatory, prohibitory, warning and informatory. Prohibitory signs (e.g. *No entry*) give notice of a Statutory Order or Regulation and entail penalties if ignored. Penalties are also entailed if a mandatory sign (e.g. *Keep left*) is ignored. With few exceptions they may both be erected only with the approval of the Minister*. Warning (e.g. *Steep hill*) and informatory signs (e.g. *Car park*) may with few exceptions be erected at the discretion of the highway authority. All must conform with existing Regulations and Directions unless specially authorised.

Pedestrian crossing markings (e.g. zebra crossings) may only be used when the Minister has approved a crossing place or scheme of crossing places.

Light signals may be erected only after the approval of the Minister.

Carriageway markings (e.g. warning lines) may be laid down at the discretion of the highway authority provided they are prescribed in Regulations or specially authorised.

There are estimated to be in the United Kingdom approximately:—

- 250,000 mandatory signs,
- 190,000 prohibitory signs,
- 900,000 warning signs,
- 270,000 informatory signs, of which 220,000 are directional signs,
- 4,000 traffic signal installations.

5. All-purpose roads are roads upon which by right of common law all classes of traffic are permitted, whereas from motorways certain classes of traffic such as learner drivers, cyclists and pedestrians are legally excluded.

There are 194,300 miles of all-purpose roads in the United Kingdom; of these:—

- 8,300 miles are trunk roads,
- 20,000 miles are class I roads,
- 17,000 miles are class II roads,
- 49,000 miles are class III roads,
- 100,000 miles are unclassified roads.

In addition there are now 200 miles of motorway and present planning envisages the construction of a further 800 miles by the early 1970's.

Trunk roads and motorways are the legal responsibility of the Minister; the rest are the responsibility of the local highway authorities of which there are some 1,300. Grants are, however, given by the Minister towards the costs of the classified roads (except in County Boroughs) including the traffic signs on them. These grants are 75 per cent. for class I roads, 60 per cent. for class II and 50 per cent. for class III.

Synopsis of Principal Recommendations

6. Though at the end of this report we have included a full list of our recommendations it may be helpful if we preface it with a brief synopsis of what we consider to be our most important conclusions.

* Throughout this report the term Minister means the Secretary of State for Scotland and the Minister of Transport.

7. We believe that our existing traffic signs are seriously out of date in relation to the present and foreseeable numbers and speeds of vehicles; we recommend a radical and urgent modernisation (paragraph 301).
8. We envisage a system of main roads other than motorways clearly distinguished by the colour of their directional signs from any other roads in the country. The object of this distinction would be to assist travellers, especially those on longer journeys, to follow the most generally satisfactory routes through our very complex road system. We have called these 'Primary routes' in our report and have suggested in paragraph 137 some criteria for their selection. We think they would be predominantly trunk and class I roads.
9. The directional signs on Primary routes should be green with white lettering except for route letters and numbers which should be yellow. On other roads directional signs should be white with black lettering and black route numbers. In both kinds of sign place names should be in lower-case lettering with initial capitals (paragraphs 136 and 143).
10. Letter sizes should in general be considerably larger than on our existing signs and should vary with the vehicle speeds and width of the roads they are on, reaching 10 inches on the fastest roads. But the principles of design we have suggested will avoid a proportionate increase in the size of signs (paragraph 141).
11. Advance direction signs should whenever possible be in map form, graphically showing the lay-out of the junction ahead, with the relative importance of the roads at the junction indicated by the width of the arms of the route symbol. We believe that this use of map signs will make an important contribution to road safety (paragraph 148).
12. We recommend that the rest of our roadside signs should, where considered appropriate, be brought into line with those in use on the Continent (paragraph 37).

We investigated the efficiency of our existing system of signs compared with that on the Continent and other systems abroad and came to the conclusion that the Continental signs using mainly symbols and not words, set within their triangular, circular or rectangular frames according to their significance, were the most effective. We considered too that whenever possible symbolic signs should speak for themselves. Nevertheless we consider that the new signs should be given powerful publicity because of the inherent difficulty of teaching the public at large (paragraph 305).
13. Since half the fatal and serious accidents on our roads take place at or near junctions we recommend that in the interests of safety the minor road be very clearly distinguished from the major. This should be done by a new and emphatic carriageway marking at the mouth of the minor road. At the junctions where sight lines are obstructed or there are other dangerous features, and at all junctions with Primary roads where there are not traffic signals or *Stop* signs, this carriageway marking should be supplemented with mandatory *Give way* signs. We thus envisage that our Primary routes will be protected at all junctions so that they effectively become 'priority routes' as in certain countries abroad (paragraphs 53 and 224).

14. Directional signs at main junctions on Primary routes should wherever possible be directly illuminated. There should be a much higher standard of sign illumination generally (paragraph 259).

15. We recommend a more extensive use of 'catseyes', warning lines and lane markings and that carriageway markings be more often laid in reflecting materials (paragraphs 241 and 242).

16. We recommend a new and greatly simplified system of signs consistent with Continental practice to indicate restrictions on waiting, loading and unloading, applicable also to clearways (paragraph 85).

This new system will make some contribution to the reduction of urban clutter. This object will be assisted if local authorities can reduce the present complexities of their traffic restriction Orders.

17. In urban areas more serious attention should be paid by highway authorities to preventing traffic signs from becoming lost in a confusion of advertisements, ill co-ordinated street furniture or an excessive number of other traffic signs where old signs have been superseded and not removed. Powers exist to have advertisements removed where they impede the visibility of traffic signs so as to prejudice safety and these powers should be more often used (paragraphs 291 and 292).

18. There should be more frequent inspection of traffic signs to ensure that they are kept clean, unobscured and in good repair (paragraphs 286 and 287).

19. There should be greater uniformity throughout the country in the use of traffic signs. It is impracticable to make it an entirely central responsibility but if official directions as to the use of traffic signs were made more explicit and were supplemented by a simply expressed and illustrated manual for highway authorities we think that a higher standard of uniformity could be achieved.

The Departments will no doubt consult local highway authorities about the determination of the initial Primary route system and about procedures for achieving uniformity in the signing of Primary routes (paragraph 300).

20. We are conscious that the changes we have advocated will entail increased costs for highway authorities. But we regard this as necessary to meet present traffic needs and more than ever essential in view of the great rise in traffic volume which faces us in the years ahead (paragraph 303).

21. We believe it to be in the interests of traffic flow and road safety that the change-over to new traffic signs should be made as quickly as possible. We think it could and should be done in five years from the introduction of new Regulations. Mandatory and prohibitory signs should be changed first since it is important that signs carrying penalties for non-observance should be uniform throughout the country as soon as possible, and the aim should be to achieve this within two years. All signs on Primary routes should be changed within three years (paragraph 302).

22. The recommendations in our report involve considerable changes from current practice and in signs with which the public have been familiar over

the years. We realise that a positive effort must be made to acquaint the public with the meaning of the new signs and systems, but with the signs recommended we consider that we have made the task as easy as possible. We believe that it should be possible in such an educational campaign to obtain the co-operation of local authorities, the motoring organisations, motor car and tyre manufacturers, oil companies, etc., as well as the press, radio and television authorities (paragraph 305).

Introduction

Present and Future Needs

23. In the nineteen years since the 1944 Departmental Committee on Traffic Signs reported great changes have taken place in the volume and character of road traffic in Great Britain. At the end of the war there were 2½ million motor vehicles on our roads. Today the total is over 10½ million and it is likely to reach 20 million by the early 1970's, and by 1980 may reach 25 to 30 million.

The number of private cars has increased from 1½ million at the end of the war to over 6½ million today, accounting for nearly two-thirds of all motor vehicles. Their acceleration and speed capabilities are considerably greater than they used to be. Although visibility from the driver's seat has been improved, the average height of private vehicles has fallen so that drivers' eyes are at a lower level. This has an effect upon their ability to see and read traffic signs and markings and it influences such problems as the height of street bollards. The number of goods vehicles has also increased, particularly in the heavier categories; there are today about 300,000 vehicles of over 3 tons unladen weight compared with 40,000 at the end of the war. Their performance has greatly improved and over this period their permitted speed has been raised from 20 m.p.h. to 40 m.p.h.

24. To accommodate this enormous increase in the volume of traffic and its changing character much road improvement and new construction has been done, and motorways will relieve to some extent the pressure upon all-purpose roads. But at the same time every resource of traffic engineering and traffic control will be necessary in the urgent task of making more efficient and safer use of the road space available. Traffic signs are an important instrument in this process and to be effective they must be modernised to accord with the changed conditions in which they operate. But since they cannot, like the traffic for which they cater, be in a continuous process of alteration, because uniformity and familiarity to drivers are so important, it is necessary that when modernisation takes place it should look beyond the conditions existing at the time and take account of those which are likely to exist within the reasonable life of these numerous and costly signs. That is to say, any review must look forward fifteen to twenty years and plan a traffic sign system which will remain efficient during that period. It must not overlook that road users include pedestrians and that drivers at some time are also pedestrians wishing to cross the road. Nor must it ignore that among pedestrians elderly people are likely to increase considerably with the rising age level of the population, and that many children must continue to use increasingly busy roads on foot or by bicycle to reach school. Though the number of accidents

on our roads has been happily reduced in relation to the number of vehicles using them, it is still horrifyingly high and every possible contribution must be made by traffic signs, as by every other means, to reduce accidents.

25. The first objective must therefore be to obtain the greatest possible effectiveness of traffic signs. The necessary impact upon drivers could be achieved by the use of glaring colours or great size. This would be aesthetically offensive as well as costly. The problem is therefore to take into account continuously the three factors of functional efficiency, aesthetic acceptability and expense. At every stage in the design of traffic signs and in the development of a comprehensive traffic sign system, the increased cost of a higher standard of sign must be balanced against the greater safety resulting and both must be assessed as accurately as possible in relation to amenity before recommendations can be made. We have been very fortunate in the assistance we have received from the Road Research Laboratory in the many tests and experiments which they have carried out to determine the relative efficacy of various aspects of traffic signs.

General Principles

26. In considering first how the greatest efficiency of traffic signs should be achieved we believe the following general principles are the most important:—

- (a) the signs must be designed for the foreseeable traffic conditions and speeds on the roads on which they are to be used;
- (b) they should be conspicuous so that they will attract the attention of drivers at a sufficient distance and should be easily recognisable as traffic signs at that distance;
- (c) they should contain only essential information and their significance should be clear at a glance so that the driver's attention is not distracted from the task of driving;
- (d) they should be legible from sufficiently far away to be read without diverting the gaze through too great an angle;
- (e) they should be placed so that they are obscured as little as possible by vehicles and other objects;
- (f) they should be designed and sited so that after reading the sign the driver is left with sufficient time to take any necessary action with safety; and
- (g) they should be effective both by night and day.

The critical factors in meeting these requirements are shape, colour, layout and size of sign, the size and kind of the symbols and lettering on it, its position and its illumination or reflectorisation.

Criticisms of Existing United Kingdom Signs

27. In considering how far existing signs met these requirements and in what ways they fell short of them, we took into account the criticisms which had been voiced in Parliament, in the press and by other means. We also sought advice from the organisations most closely concerned with traffic signs. A list of these is given in Appendix I and we are grateful to them for the careful study which they gave to the subject and for the comments and constructive criticism which we received from them. We were assisted very greatly by the work done on the

signing of motorways by Sir Colin Anderson and his committee, and we were fortunate in having as our designer Mr. Jock Kinneir who had already served that committee and could thus bring considerable experience to the design problems which faced us on all-purpose roads.

28. The main current criticisms of United Kingdom traffic signs are that:—
- (a) roadside signs are too small to be readily recognisable as such and to be easily read by drivers travelling at the normal speed of traffic;
 - (b) they do not have a simple, integrated appearance;
 - (c) the more important signs are not readily distinguishable from the less important at long range;
 - (d) they are often not effective at night;
 - (e) they are different from those used on the continent of Europe and only those who can read English can fully understand them;
 - (f) they are often mounted too high, particularly in rural areas;
 - (g) they are often badly sited in relation to junctions; and
 - (h) there is insufficient continuity of place names on directional signs.

Signing Systems Abroad

29. In considering what changes should be recommended we thought it right to study the systems of traffic signs used in other countries, to discover how British signs compared with them in the efficiency of their impact upon drivers and then to decide whether any one system merited adoption with or without modifications.

30. The system most widely used originated from the United Nations World Conference on Road and Motor Transport which was held in Geneva in 1949. This proposed a Protocol on road signs and signals which should be adopted by those countries that wished to do so pending the establishment of a world-wide system. The Protocol signs have already been adopted for use in about 30 countries including most of those in Europe. The United Kingdom has, however, not hitherto signed the Protocol.

The main difference between United Kingdom and Protocol signs is that the latter rely to a much greater extent on symbols only, whereas current United Kingdom practice is to use both symbols and words. The avoidance of words has the advantage that bigger symbols can be used without increasing the size of the sign and thus its message is more immediately understood. Another advantage is that a knowledge of the local language is not required. In the Protocol system the symbols are placed inside the warning triangle or prohibitory circle rather than below them and the waiting restriction signs have blue centres in a red circle without differentiating by colour between no waiting and limited waiting. The mandatory signs have white symbols on a circular blue background. The informative signs, like those used in the United Kingdom, are rectangular in shape.

31. After the 1949 Geneva Conference a group of six experts, drawn from Turkey, India, Southern Rhodesia, United States of America, France and Chile, attempted to devise a system which would be acceptable in both the New World and the Old. This resulted in a United Nations Draft Convention in 1953 but this has not been widely adopted. These 1953 Convention signs, like the Protocol signs,

rely mainly upon symbols but employ different shape and colour codes. The warning signs, for example, bear black symbols on a yellow, diamond-shaped background and the prohibitory and mandatory signs are circular in shape with black symbols within a red circle and black legends on a white background.

32. The other two main systems of traffic signs are the American and African systems. In the former most signs consist of words rather than symbols and warning signs are diamond shape with black lettering on a yellow background while regulatory signs are rectangular with black lettering on a white ground.

The African (or Johannesburg) system, devised in 1937, follows the United Kingdom in placing a symbol on a separate rectangular plate below a red triangle for danger signs, a red disc for prohibitory signs and a red circle for mandatory signs. But the background of the rectangular plate is yellow.

Comparison of Systems

33. We rejected the 1953 Convention system which, apart from having only two adherents in Europe, did not seem to us to be superior as a whole to the 1949 Protocol system. We also rejected the African system which so closely follows United Kingdom practice as to be open to similar criticisms.

34. The Road Research Laboratory had compared for us a selection of the present United Kingdom designs with the 1949 Protocol and American equivalents. The question for which an answer was sought was—'If signs of each of the three systems had the same area, which system would have the most effective designs to drivers educated in their meaning?'. As the area of a sign roughly determines its cost the most effective system is also the cheapest. In the tests therefore signs of equal area were compared and the observers taking part had been fully educated.

These tests proved that the *class of sign* was recognised at the greatest distance in the American system, the Protocol system was second at a distance of 9 per cent. less; the United Kingdom system was least readily recognisable at 19 per cent. less distance. In most cases the American and Protocol systems use simple geometrical shapes where the United Kingdom system uses composite designs which seem to us to lack integration.

The average distance at which the *message on signs* could be identified was greatest for the Protocol system, 15 per cent. less for the United Kingdom system and 19 per cent. less for the American. The superiority of the Protocol system in this respect is due mainly to its extensive use of symbols.

35. The complete identification of the sign seems to us to be the more important of the two criteria and we have therefore concluded that the Protocol system is, where the public has learnt the meaning of the symbols, the best of the three.

Preference for 1949 Protocol System

36. Our investigation led us to the conclusion that the choice before us was threefold:—

- (a) to try to design an entirely new set of traffic signs, which would have to be at least as effective as any system at present in use;

- (b) to adopt generally the Protocol system, which we believe is collectively the most efficient of those examined, and which permits considerable latitude and variation, but to modify individual signs where necessary;
- (c) to increase the size of the United Kingdom signs at present in use.

37. We recommend that the second course be followed. Our reasons for doing so are these:—

- (a) by largely eliminating words Protocol signs have the advantage of being able to use a larger symbol; they also obtain a greater impact upon drivers by placing the symbol within the triangle or circle so that both meet the eye together; the Protocol signs, when learnt, would therefore be the most effective;
- (b) in the interests of road safety it is important that signs in this country should be easily understood by as many drivers from overseas as possible; Protocol type signs would be familiar to those from the Continent and to many visitors from other parts of the world;
- (c) British visitors to the Continent would be faced with fewer unfamiliar signs; and
- (d) such a step would be in accord with the general trend towards closer contact with the Continent.

38. We do not believe that there is any need to try to design a new system of signs since we are satisfied that the 1949 Protocol system, modified and amplified where this is essential to meet the particular needs of traffic conditions in the United Kingdom, would be as well suited for use in this country as it is on the Continent. The fact that it is under constant review by the Inland Transport Committee of the Economic Commission for Europe should ensure that improvements to it are made whenever these are thought to be necessary and are internationally acceptable. It is a living system subject to constant scrutiny, development and adaptation to changing needs.

39. There seemed to us little virtue in retaining the existing system of United Kingdom signs in an enlarged form and improving their night-time visibility. Such a course would do nothing to overcome certain of the defects of the system, in particular its wordiness and lack of integration.

General Design Considerations

Lettering

40. Hitherto traffic signs on all-purpose roads have exclusively employed capital letters. Motorway signs, however, are in lower-case lettering with initial capitals. They have been in use now for some time and have received very general approval.

41. We have been concerned to ensure that the type of lettering used on all-purpose roads should be both effectively legible by drivers who may be travelling at high speeds, and also aesthetically acceptable. A further factor which we have

kept very much in mind has been the implication of lettering upon the size and proportions of signs and consequently upon their cost.

We have studied the evidence which was before the Advisory Committee on Traffic Signs for Motorways and also the results of experiments carried out more recently by the Road Research Laboratory in which signs of equal area using serified capitals, sans-serifed capitals and lower-case lettering were compared. Where the signs were of equal area it was found that there was little difference in legibility between the three types of lettering.

42. We recommend the use of lower-case lettering with initial capitals for traffic signs generally because we prefer it and because we think its outlines are more familiar to the reading eye. An additional factor is that in general a sign with lower-case letters is narrower but higher than one of equal area using capital letters; this is an advantage when site conditions restrict the width of sign for example on town pavements or on narrow country roads.

43. We believe that there is a small number of special signs for which capital letters should be used; these we specify later.

44. Our designer has at our request designed two alphabets of different weights with numerals and other characters. These are illustrated in figures 1 to 6. (Throughout this report figure numbers refer to illustrations in Appendix II.) The Transport Heavy alphabet is for use wherever signs have a light background and the Transport Medium wherever they have a dark background. We recommend that these be used for all the signs included in this report.

Colour and Shape

45. It is important that traffic signs should not only be easily recognisable as such but also that one class of sign should be immediately distinguishable from another. Thus drivers may, for example, receive a general warning of danger before they reach the point at which the message on the sign becomes readable. Both colour and shape can, and we think should, play a part in achieving this object.

46. The Protocol requires that signs should be of three basic shapes—triangular for warning signs, circular for those giving definite instructions and rectangular for informative signs. It further requires that:—

- (a) warning and prohibitory signs (with one or two exceptions) should have a red border with a white or light yellow ground and black or dark symbols;
- (b) mandatory signs should have white symbols on a blue background;
- (c) directional signs should be in light lettering on a dark background, or vice versa; and
- (d) other informative signs should have white legends on a blue background or, in certain cases, black symbols on a white rectangular background within a blue surround.

The signs which we have recommended and which are illustrated in Appendix II follow these principles. The colours which we have chosen for directional signs, and our reasons for doing so are set out in paragraphs 136 and 139.

47. With the exception of traffic signals and zebra crossing beacons, all posts, brackets and fittings used for the mounting of signs, as well as the backs of signs and any framing, should be coloured grey.

Traffic signals and zebra crossing beacons should be mounted, as at present, on black and white banded posts.

48. The particular colours which we recommend should be used for signs generally are given in Appendix IV.

Size

49. In paragraph 141 we make recommendations about the appropriate size of lettering required on directional signs according to the speed of traffic on the road on which the sign is erected and according to the different distances between the driver's path and the sign. In just the same way a range of sizes is required for other types of sign. We therefore recommend that warning, mandatory and prohibitory signs should be of the sizes set out in the table at Appendix VI. On narrow-shouldered country roads carrying slow traffic or at urban sites where space is restricted smaller signs will no doubt have to suffice and could be specially authorised but the standards set should be adhered to as closely as possible.

The size of informatory (other than directional) signs will usually depend upon the nature of the symbol and/or legend which they carry and the category of the road on which the sign is erected. In general we think that if these signs are roughly the same in area as the warning signs we have recommended they will be adequately seen and read at the vehicle speeds of the roads on which they are placed.

In the interests of amenity we have tried to keep signs as small as possible consistent with effectiveness.

Review of Signs

50. In this section of the report we review individual signs, dealing with them in their various groups—mandatory, prohibitory, warning, directional and other informatory, and in each group we discuss existing signs and make our recommendations for new signs. Throughout this report, *Regs.* numbers refer to illustrations in the Schedules to the Traffic Signs Regulations 1957, as amended. In the main the signs are considered in the order in which they appear in these Regulations. Illustrations of our recommended signs will be found in Appendix II. Where the word 'Protocol' is used it means signs agreed at the United Nations Conference on Road and Motor Transport 1949 and subsequent amendments. In paragraph 37 we have recommended the general adoption of the Protocol system.

A. Signs Giving Definite Instructions

(a) Mandatory Signs

51. In general the mandatory signs recommended have a white symbol on a blue circular background. But there are two deliberate exceptions; the *Stop* and *Give way* signs have distinct shapes and colours and capital letters in order to produce a more immediate impact.

Stop

52. The most important of our existing signs which are erected to indicate junctions is the *Halt at major road ahead* sign (*Regs. 204*). The inverted red triangle within the red circle which surmounts this sign follows the Protocol. Its injunction, however, is contained on a T shaped white plate below this symbol. This plate was purposely made different in shape from any other in order that the sign would be recognised even when its legend was covered by snow. On balance we do not think the dangers of complete defacement by snow sufficiently great to justify a radical departure from the Protocol, since in such weather conditions drivers would most likely be proceeding slowly and with extra caution. We therefore recommend the adoption of the sign at figure 7 incorporating the word 'Stop'. We believe this word to be necessary on safety grounds and preferable to 'Halt' as used at present.

The French highway code stresses that this sign has a dual significance. Drivers must not only stop but also (as is indicated by the inverted triangle) give way to traffic on the priority or major road. This is an important distinction and we recommend that it should be emphasized in our own Highway Code.

We recommend that the *Stop* sign be used only at junctions where visibility is so bad that it is imperative to stop on every occasion. It is important that this rule be strictly followed. If the sign is used where to stop is never or rarely necessary it will tend to be ignored and its impact upon drivers will be depreciated, with serious consequences to road safety (see paragraph 225).

Give way

53. At certain junctions where control is not exercised by traffic signals, police, or a *Stop* sign there will nevertheless be a need for a sign in addition to the new transverse carriageway marking which we advocate in paragraph 224. We therefore recommend for this purpose the sign at figure 8. Since avoidance of accidents will depend upon drivers obeying the sign we believe that it should be given a legal mandatory significance and the meaning of 'proceed so as not to cause inconvenience or danger to traffic on the major road'. How to express this most clearly in Regulations will be a matter for discussion with legal draftsmen. The message of the inverted triangle should be reinforced by the words 'Give way', which we regard as a more positive command than that contained in the *Slow major road ahead* sign (*Regs. 205*) which we recommend should no longer be used. In recommending this *Give way* sign we are deliberately departing from the Protocol not only by adding words but in advocating that the sign should be made mandatory.

In our view the *Give way* sign should be used on all minor roads at their junctions with Primary roads in rural areas so that the Primary roads became 'protected' routes; at junctions where there is a considerable volume of traffic on both the major and the minor roads and at any junction where the highway authority decides that a more emphatic distinction is needed than that given by the carriageway marking itself (see paragraph 224).

Turn right (Regs. 209)

54. This sign should be replaced by a mandatory arrow in the form shown at figure 12 or in the form shown at figure 13 when used in advance of the junction.

Turn right. One way only (Regs. 210)

55. For this we recommend the mandatory arrow at figure 12 with the words 'One way' on a plate below it (figure 12a).

Keep left. One way only (Regs. 211)

56. This sign is used on roundabouts. We recommend that it be replaced by a sign as at figure 12 (see also paragraph 110).

Keep left. Dual carriageway (Regs. 212)

57. This injunction should be given by the sign at figure 14 which should be placed at the beginning of the dual-carriageway's central reservation and should normally be of the largest permitted size (Appendix VI). Where the road alignment is such that there may be danger of vehicles entering the wrong carriageway the mandatory arrow should be supplemented by a *No entry* sign placed on both sides of the prohibited carriageway.

Turn left. Dual carriageway (Regs. 213)

58. This should be indicated where necessary before the junction by the sign at figure 13. The sign at figure 12 is for use at the junction on the central reservation. Both should be supplemented by the plate at figure 13a.

One way traffic (Regs. 214)

59. This sign is used to indicate that the road straight ahead carries one-way traffic. We recommend that the message be conveyed instead by the informative sign shown at figure 97 placed on the central refuges or, where there are no refuges, by a forward pointing informative arrow (figure 98) placed on either side of the road alternately along its length.

One-way streets should be indicated by the following signs:—

- (i) a mandatory arrow (figure 13) in side streets approaching a one-way street;
- (ii) a horizontal informative arrow (figure 99) with the words 'One way' below it at a point in the one-way street opposite a side turning;
- (iii) the arrows in figure 97 on central refuges within one-way streets; and
- (iv) where there are no refuges and a sign is considered necessary a forward pointing informative arrow (figure 98).

Turn left (Regs. 215)

60. The present rectangular sign is used at the side of a three-light traffic signal. We recommend that words be avoided by adoption of the mandatory arrow sign (figure 12) lit internally. Since this sign is circular it should be placed above the traffic signals and should be of such a size as to be distinct from the signals themselves and clearly seen from a distance.

Keep left (Regs. 216 and 217)

61. These are signs for use in bollards and we recommend that they should also be replaced by the sign shown in figure 14.

Stop for weight check (Regs. 218)

Stop (Regs. 219)

Go (Regs. 220)

Police stop (Regs. 221)

Police slow (Regs. 222)

62. We refer to these signs in our section on temporary signs (paragraphs 198, 205 and 207).

(b) Prohibitory Signs

63. With the exception of the *No entry* sign and waiting restriction signs all prohibitory signs are distinguished by a red circle with a white centre which usually carries a black symbol. Waiting restriction and limited parking signs are dealt with in paragraphs 83 to 87.

No entry (Regs. 304 and 305)

64. The Protocol *No entry* sign is the same as ours but without words. We see no reason why in this country the addition of words should be essential to its understanding and we recommend that they cease to be used (see figure 15).

No right/left turn (Regs. 306 and 307)

65. We have considered to what extent this message would be more effectively presented in the mandatory form as in figure 12 or figure 13, as is increasingly being done on the Continent, rather than in the present prohibitory form. Either is of course possible, but in our view mandatory arrows would be less satisfactory at complicated junctions where one turn is prohibited and perhaps three or more permitted; we think it would be more effective to continue to give drivers the simpler message, to which they are already accustomed, prohibiting them from going in a single direction. If a wider use of the mandatory form develops abroad, we recommend that the case for its adoption be given further study.

We thus recommend the sign shown at figure 9 in place of the present *No right turn* sign, and the sign at figure 10 to indicate *No left turn*. When these signs are used at signal controlled junctions they should invariably be internally illuminated and mounted above the traffic signals.

Suggestions have been made that there should be differentiation by colour between *No right turn* and *No left turn* signs. The Protocol makes no provision for this and we do not consider it necessary since the direction in which the cancelled symbol points makes the distinction obvious even from a distance.

Prohibited all motor vehicles unless requiring access to premises in the road (Regs. 308)

66. We recommend that this prohibition be indicated by the sign at figure 17, qualified when appropriate by the plate at figure 17a.

Prohibited all vehicles except perambulators and hand propelled invalid chairs unless requiring access to premises in the road (Regs. 309)

67. This prohibition should be expressed by the sign at figure 16, which we think will be used so rarely that it should always be supplemented by a plate bearing the words 'No vehicles' together with any exceptions which apply.

This Protocol sign not hitherto used in the United Kingdom indicates that the street is 'closed to all vehicles in both directions' whereas the *No entry* sign prohibits the use of the street in only one direction.

Prohibited public service vehicles (Regs. 310)

68. We recommend the sign at figure 18.

Prohibited locomotives, tractors, heavy motor cars and motor cars with seats for more than 15 persons unless requiring access to premises or land adjoining the road (Regs. 311)

69. If the criterion for the exclusion expressed by this very wordy sign is weight, it could be achieved by the sign at figure 20 meaning 'no entry for vehicles exceeding — tons laden weight', or by the sign shown at figure 21 indicating 'no entry for vehicles having an axle weight exceeding — tons'. But if it is width, we recommend the sign at figure 22 which means 'no entry for vehicles having overall width exceeding — feet'. Either sign would need to be supplemented when appropriate by the plate at figure 17a stating 'Unless requiring access to premises'.

Play street. Prohibited all vehicles 8 a.m. to sunset unless calling at premises in the street (Regs. 312)

70. We recommend use of the sign at figure 16 in conjunction with the plate at figure 16a.

Weight limit 10 tons (Regs. 313)

71. This should be indicated by the sign at figure 20.

Weight limit 4 tons. Only one motor vehicle on bridge (Regs. 314)

72. Again we recommend the sign at figure 20 but supplemented by the plate at figure 20a.

Speed limit 10 m.p.h. for weights exceeding 12 tons (Regs. 315)

73. This should be indicated by the sign at figure 29 together with the plate at figure 29a.

Signs indicating restrictions on waiting, loading and unloading (Regs. 316 to 324)

74. We have given our proposals for these signs in our section on waiting restriction and parking signs (paragraphs 83 to 87).

No cycling (Regs. 326)

75. We recommend the sign at figure 19.

Speed limit 20 m.p.h. (Regs. 327)

76. This sign has been used in the past where the speed limit is imposed by the local authority as distinct from the general speed limit on restricted roads imposed by the Road Traffic Acts. We see no reason in principle to make this distinction which is in any case of very rare application, and we recommend that all speed limits, however imposed, be indicated by the sign at figure 27. The 30, 40 and 50 m.p.h. limits are already indicated in this form. The point at which a road ceases to be subject to a maximum speed limit should invariably be indicated by the sign at figure 28.

Minimum speed limits

77. Whilst dealing generally with speed limit signs we deal here with the minimum speed limit sign although it is mandatory, not prohibitory.

On certain high speed roads abroad traffic is prohibited by law from moving slower than a certain specified speed. Powers were taken in the Road Traffic Act 1962 to impose minimum speeds on all-purpose roads in this country and powers have previously existed to impose them upon motorways though none have hitherto been imposed under Road Traffic Acts. Should minimum speed limits be required we recommend the sign at figure 30. The end of a minimum speed limit should be indicated by the sign at figure 31.

The introduction of a minimum speed limit will be a considerable innovation and it is quite uncertain when it may take place. It may therefore be first used at a time when general publicity for symbolic signs has lost its impact. In this case it may be desirable to add the word 'Minimum' to the sign at least for an educational period.

Portable school crossing patrol signs

78. In place of the sign at present used as prescribed by The Traffic Signs (School Crossing Patrols) Regulations 1953 we recommend the sign shown at figure 142 modified to show the words 'Stop. Children'.

No overtaking

79. The Protocol *No overtaking* sign is widely used on the Continent. Orders prohibiting overtaking are rare in this country but where they are in force we recommend the modified Protocol sign (figure 24) supplemented by the plate as illustrated at figure 70.

No U turns

80. In busy roads it is becoming increasingly necessary to prohibit drivers from making a U-turn when they wish to go back. Where an Order forbids U-turns we recommend use of the sign at figure 11. Where the prohibition extends over a distance the sign should be used at the beginning with a plate as at figure 70 and at the end with a plate as at figure 26a.

Giving way at roundabouts

81. In order to assist traffic flow at heavily used roundabouts experiments are being made by the Ministry of Transport in erecting traffic signs which require drivers entering a roundabout to give way to traffic from the right, i.e., to traffic already in the roundabout. If it is decided to enforce this permanently at certain roundabouts we consider that the sign at figure 8 should be used at each entry to the roundabout. Since traffic within the roundabout must be approaching the entering driver from the right we see no need for including the words 'To traffic from right' as on the present experimental signs. Should it ever become a general rule of roundabouts, as it is in some countries abroad, that entering traffic should give way to traffic already in the roundabout, it should be imposed by law or code and in this case traffic signs for this purpose would no longer be necessary.

Priority to a vehicle from the opposite direction

82. Where short sections of road are reduced to single lane working by road works or some other obstruction or where a narrow bridge has to be crossed and where there are no light signals we recommend use of the sign at figure 23. This conveys the message 'priority to be given to vehicles coming from the opposite direction'. At the other end of the single lane section, the informatory sign at figure 132 should invariably be used (see paragraph 198).

(c) Waiting restriction and limited parking signs (Regs. 316 to 324)

83. With the rising volume of road traffic it becomes increasingly necessary to combat urban congestion, and also to prevent stopping on fast through routes in rural areas, by placing legal prohibitions or restrictions upon the occupation of streets and roads by standing vehicles. Orders to this effect made by the Minister and local authorities are at present evidenced by four different kinds of prohibitory signs:—

- (i) *No waiting* signs. These have a black legend upon a yellow ground within a red circle, the hours of the restriction, including those on loading and unloading, being written, also in black letters, usually on the face of the sign, though sometimes below it on a separate rectangular plate.
- (ii) *Limited waiting* signs. These have a white legend on a blue ground within a red circle, the duration of the waiting period being normally written on the face of the sign, for instance, '20 mins. in any hour'.
- (iii) *Clearway* signs. The majority of clearways are on fast rural roads and restrictions on these have no time limitation, and are in operation at all hours of the day and night. A few, however, are in urban areas. These are termed peak-hour clearways and are in operation only during the most heavily trafficked periods of the morning and evening, between which periods waiting restrictions are likely to be in operation. Both types of clearway restrictions are indicated by signs having the clearway symbol (a split arrow) and the word 'Clearway' (or 'Peak-hour clearway' if appropriate) in white on a black ground within a red circle. On peak-hour clearways the signs are further supplemented at intervals by *No waiting* signs in the form of (i) above indicating on the face both the restrictions which apply in off-peak hours and the word 'Clearway' with the times and days of its operation.
- (iv) *Limited parking* signs. These have a white capital P on a blue rectangular ground with a plate below indicating that it is not permitted to leave a vehicle for more than a stated period.

84. The investigation made for the Road Research Laboratory by the social survey unit of the Central Office of Information showed that a considerable proportion of drivers in this country do not appreciate the colour difference between *No waiting* and *Limited waiting* signs. Nor is there at present any generally accepted colour distinction abroad between these two classes of restriction. The Protocol states that 'the sign to indicate restricted stopping or waiting' (figure 25) may be supplemented by a plate underneath it indicating either the hours during which the waiting prohibition applies or the duration of authorised waiting, or both. It will thus be noticed that the same sign on the Continent is stated to restrict both waiting and stopping, whereas in this country exceptions are invariably made in *no waiting* Orders to permit stopping, that

is, to the extent of putting down or taking up a passenger. This exception is not, however, made in clearway Orders on rural roads save for buses, and in peak-hour clearways on urban roads it extends only to buses and taxis.

Owing to the need felt increasingly on the Continent to differentiate between the signs indicating 'No waiting' and 'No stopping', the Economic Commission for Europe Working Party concerned with traffic signs has recently recommended that a sign with crossing transverse red bars (figure 26) as distinct from a single transverse red bar (figure 25) be used to indicate that stopping (which includes loading and unloading) is prohibited.

85. We recommend:—

- (i) That the newly introduced Protocol sign at figure 26 be adopted to indicate 'No stopping'. It therefore becomes appropriate for use on clearways, since (with the exceptions referred to above) stopping, and not only waiting, is prohibited on clearways. We recommend that it be adopted instead of our present *Clearway* signs which are not known abroad. The size of this new *No stopping* sign should vary with vehicle speeds and the end of a clearway should be indicated by the same sign with the plate at figure 26a beneath it. The detailed conditions on a peak-hour clearway should be indicated on a plate beneath the sign.
The same *No stopping* sign could potentially be used on short lengths of street, for instance, on corners in urban areas, where all stopping is prohibited, but in the interests of not increasing the number of roadside signs we recommend that some form of yellow carriageway or kerb marking be used alone to indicate this.
- (ii) That the Protocol sign at figure 25 should be used to indicate 'No waiting' and that the periods during which waiting is prohibited be indicated by black lower-case letters on a white plate beneath it (figure 25a). If no times or days are given the prohibition will be continuous. If prohibitions are indicated from Mondays to Fridays it follows that no prohibitions exist on Saturdays and Sundays.
- (iii) If any limitation is imposed upon loading and unloading it should be indicated by details given in black lower-case letters on a yellow plate (figures 25b and 25c). Thus hauliers and others delivering or collecting goods will be able to see immediately and from some distance whether or not any restrictions exist upon loading and unloading.
- (iv) Where waiting is restricted to a limited period this period should be shown by white lower-case letters on a blue plate (figure 25d) below the *No waiting* sign at figure 25. White on blue is chosen for this permissive message to distinguish it from the restrictive message indicated by black on white or yellow.
If more than one of these three messages is required they should be carried on a single plate (figure 25b).
- (v) We have considered whether times on plates should be expressed in terms of the 24-hour clock which would save space but we think that this is premature.
- (vi) Where this restriction of waiting time is in force on different sides of the street on alternate days the change should be indicated by a flap to the rectangular plate analogous to the flap device now used on the *No waiting* and *Limited waiting* signs themselves. These flaps should be secured in

position to avoid interference. We see disadvantages in these alternating systems and we refer again to this in paragraph 86.

- (vii) Where a time limit is imposed in a designated parking place it should continue to be indicated by a plate below the P sign at figure 115. If necessary this plate should also indicate any restrictions which may be imposed upon the type of vehicle permitted at the parking place and any conditions which must be observed in regard to the use of lights at night. But the plate should not attempt to reproduce, as is sometimes the case at present, all the detailed conditions of the parking place Order.
- (viii) Points of entry to a parking meter zone should be indicated by the sign at figure 129; conditions relating to the use of meters should be shown in black letters on a white rectangular plate below the sign. Exits from the zone should be shown by the sign at figure 130.

We are aware that in marginal cases limited waiting periods now designated by waiting restriction signs extend to two hours, though the normal is 20 minutes in any hour; also that restrictions at designated parking places may be as short as one hour. This is liable to be confusing to drivers and we would advocate that places where waiting is permitted for one hour or more should be designated parking places and thus be indicated by the more positive P parking sign (figure 115), prohibitory signs (figure 25) being confined to places where only shorter periods of waiting are permitted.

86. We understand that the basic criterion which at present guides a local authority in deciding whether limited waiting be permitted under a prohibitory Order made in accordance with Section 26 of the Road Traffic Act 1960 or alternatively under a designated parking place Order made under Section 81 (2) of the same Act, is that designated parking places, even if their time limit is restricted to one hour, may only be located where parking does not restrict access to premises. In law those drivers who take advantage of the apparent permission now shown on a circular prohibitory sign to wait for 20 minutes in any hour are liable to prosecution if by so waiting they deny access to premises. In practice this legal liability is reduced by varying the limited waiting from one side of the street to the other on alternate days. This arrangement is alleged to benefit shopkeepers since on one day they enjoy the greater proximity of customers whilst accepting some denial of access by delivery vans and on alternate days vice versa.

These alternating arrangements are at present indicated by 'flap signs' which have to be changed each day, the reciprocal change being also necessary to the sign on the opposite side of the street. These arrangements not only create work for the local authority but are confusing to drivers and add to urban street clutter.

We would therefore recommend Departments to urge local authorities to consider:—

- (i) to what extent waiting restrictions can be made simpler and more uniform;
- (ii) whether alternating waiting arrangements cannot be diminished or abolished, a decision being taken on traffic grounds as to which side waiting will be allowed; and
- (iii) whether limited waiting for any period longer than one hour cannot be confined to designated parking places. These could be indicated by the positive parking sign, and the negative waiting restriction sign would be used only where waiting is for less than one hour.

87. In order to diminish the number and complexity of waiting restriction signs we further recommend:—

- (i) that in future they be placed at right angles to the street, with the legend on both sides of the sign, so that they may be more visible to moving traffic than is at present the case;
- (ii) that their message be extended by the use (subject to experiments now being conducted in and near London) of a broken yellow line at the edge of the carriageway to indicate ordinary waiting restrictions and by a continuous yellow line where restrictions exist on loading and unloading as well as on other waiting. We understand that the experiments referred to above have already tended to indicate that the number of waiting restriction signs on posts can be reduced where yellow lines are used;
- (iii) that, assuming this greater visibility to be achieved where signs are supplemented by yellow lines, the permitted distance between waiting restriction signs be increased to 300 feet but with repeater signs near junctions. The intervals between signs for peak-hour clearways should be 400 feet and for rural clearways one mile, both subject to repeaters being placed near junctions;
- (iv) that terminal waiting restriction signs should have beneath them a black arrow on a white plate (figure 25a) pointing in the direction in which the restriction operates;
- (v) that these arrows and such plates as may be necessary below the signs to indicate the details of waiting restrictions, loading and unloading restrictions and limited waiting provisions should be parallel with the street. Otherwise they may obstruct pedestrians and will require to be duplicated on both sides of the mounting post;
- (vi) that the posts on which waiting restriction signs are mounted cease to be painted with black and yellow bands and that these and also the posts carrying the new clearway signs be painted grey as recommended in paragraph 47; and
- (vii) that where practicable waiting restriction signs should be mounted on existing structures (see paragraph 275).

B. Warning Signs

88. Warning signs are distinguished by a red triangle containing a black symbol on a white ground.

Junctions (Regs. 105 to 108)

89. Our Regulations prescribe different symbols for T junctions, staggered junctions and crossroads. Since three variants are possible for a T junction and two for a staggered junction, there are thus six junction warning signs prescribed for use in this country.

The Protocol prescribes a single generalised symbol in the form of a St. Andrew's cross (Appendix III figure A) for use at any form of junction between non-priority roads. We think that the more accurate diagrammatic indication of the form of the junction given by our existing symbols will continue to be more helpful to drivers than the generalised symbol of the Protocol sign. We therefore recommend that they be retained but placed within the warning triangle as shown in figures 32 to 35.

The only other junction warning sign prescribed by the Protocol is a sign (Appendix III figure B) to be used on priority roads to indicate that there is an intersection ahead with a non-priority or minor road. Its meaning appears to be twofold, that the driver is on a priority road but that he should nevertheless take some care since a measure of danger exists. This sign seems to us to give a contradictory and confused message, and might encourage drivers on the priority road to ignore or take too little heed of the junction ahead. We therefore recommend that we should not adopt this Protocol sign.

In practice we do not think that the junction warning signs which we recommend will be widely required. On major roads they will only be needed on those rare occasions where there are no traffic signals and no map type advance direction sign and where drivers cannot see a side turning or the direction signs associated with it, for example, because of a bend or hump in the road. On minor roads, junction warning signs will only be needed where all the following criteria apply:—

- (i) there is no map type advance direction sign;
- (ii) there is no *Give way* sign;
- (iii) there is no *Stop* sign or traffic signals; and
- (iv) the highway authority considers that a roadside warning sign is necessary in addition to the differentiating carriageway markings.

The distinction which we draw between major and minor roads is explained in our section on carriageway markings (paragraph 223 to 225).

Roundabout (Regs. 109)

90. The sign at figure 36 should be used wherever it is necessary to indicate the approach to a roundabout and adequate warning is not conveyed by a map type advance direction sign. Since a serious accident record has emphasised the need for ample and emphatic advance warning of roundabouts on high-speed dual-carriageway roads we recommend that, where appropriate, the sign should be supplemented by a plate bearing the legend 'Reduce speed now' (figure 36a) and sited as proposed in paragraph 266.

Bends (Regs. 110 to 112)

91. We recommend the signs at figures 37 and 38, the symbols being reversed if required by the direction of the road. Where there is a succession of bends over a distance the sign at figure 39 should be supplemented by a plate as at figure 70. The word 'for' is necessary because the addition of a distance only should denote the distance ahead at which the hazard occurs.

We have considered whether any notation could usefully be added to signs giving warning of bends in order to inform drivers of the sharpness of the bend they are approaching. This is done in certain countries abroad by indicating on the sign the speed above which it would normally be dangerous for most types of vehicles to negotiate the bend. A possible alternative is to indicate the sharpness of the bend by a scale expressed in figures, say from 1 to 5. In assessing the severity of a bend not only its turning angle must be taken into account but also such factors as camber, the condition of the road surface and vehicle speeds. We believe that some notation on signs would be helpful to drivers but we recommend that further research should precede any decision on the form which this notation should take.

Dangerous hills (Regs. 113 to 118)

92. We recommend that the sign at figure 45 should be used at the top of dangerous hills when the gradient is 1 in 10 or steeper. On very steep hills or on long steep hills where an additional warning is essential the sign should be supplemented at appropriate points on the hill by the plates at figures 45a, b and c. We recommend also that the sign at figure 45 be used at the foot of gradients which are likely to cause trouble to ascending drivers. It seems to us unnecessary that the plates at figures 45a, b and c should require Ministerial approval in each case, as at present, before they are erected.

Road narrows (Regs. 119)

Narrow bridge (Regs. 120)

93. Both these hazards should be indicated by the sign shown in figure 41.

Tram pinch (Regs. 121)

94. There is no Protocol equivalent for this sign and since trams have now been largely abandoned, we recommend that no warning sign for this hazard be prescribed. Where signs still exist their retention for so long as they are needed should be authorised.

Single file traffic (Regs. 122)

Single track road (Regs. 123)

95. There are no Protocol equivalents for these. We recommend that the *Road narrows* sign (figure 41) be used, supplemented by the plate shown at figure 41a or figure 41b.

Hump bridge (Regs. 124)

96. There is no warning sign in the Protocol specifically for a hump bridge. We think one is necessary and recommend the design at figure 46. This sign should be supplemented by a warning line on the carriageway but if the road over the bridge is more than 18 feet wide and the Departments' criteria for the use of double white lines are met they should be used.

Low bridge headroom 14' 0" (Regs. 125)

1½ m. ahead. Low bridge headroom 14' 0" (Regs. 126)

440 yards (arrow to the left) low bridge headroom 14' 0" (Regs. 127)

97. Height and width restrictions are commonly indicated on the Continent by prohibitory rather than warning signs, but the Protocol permits limitation of height and width to be indicated within a warning triangle and we therefore advocated the use of the sign at figure 64. Where it is necessary to show the distance to the bridge and the direction in which it lies the plates at figures 71, 72 or 73 should be added below the sign.

14' 0" headroom (Regs. 128)

98. A similar sign (figure 64) should be attached to the bridge itself and a chord marking (figure 64a) incorporated to give the warning conveyed by the sign prescribed at *Regs. 128*.

Concealed level crossing ahead (Regs. 130a, 130b and 130c)

99. These signs already follow the Protocol and we recommend no change.

Level crossing with gates (Regs. 130)

100. We recommend the sign at figure 48 for use in advance of level crossings provided with gates or some other form of barrier.

Unguarded level crossing (Regs. 131)

101. On the approach to level crossings where there are no gates or other barriers the sign at figure 49 should be used. In spite of the progressive adoption of diesel and electric locomotives it does not seem necessary to depart from the symbolic steam locomotive which is more easily recognisable and is still widely used.

Trains cross here (Regs. 132) and Surmounting cross (Regs. 101a)

102. The Protocol provides that in the immediate vicinity of any level crossing without gates or barriers there should be a sign in the form of a St. Andrew's cross which may, if necessary, be backed by a rectangular plate of neutral colour. We recommend that the existing sign (*Regs. 101a*) should be retained for use either alone or with twin flashing red light signals at all level crossings without gates or barriers.

Tramway crossing (Regs. 133)

Trams cross here (Regs. 134)

103. Our remarks in paragraph 94 apply equally to these signs. In some areas, industrial trains are known as trams but we think that where these cross roads they should be regarded as trains and the level crossing signs recommended above should be used.

Uneven rails (Regs. 135)

104. We recommend the sign at figure 47 which is used on the Continent to indicate an uneven road.

Single track road with passing places (Regs. 136)

105. There is no Protocol equivalent for this. As this sign is little used, we recommend no immediate change. But where new signs are required or when old ones need to be replaced we suggest that they should take the form of informatory signs.

Swing bridge (Regs. 137)

106. A Protocol symbolic sign is prescribed for use on the approach to any type of bridge which can be opened. We recommend the sign at figure 58.

Gate across road (Regs. 138)

107. There is no Protocol equivalent for this sign and we do not think that a symbol would be sufficiently distinctive. We therefore recommend that the word 'Gate' (or 'Gates' as appropriate) should be used as shown in figure 62.

Ford (Regs. 139)

Deep ford (Regs. 141)

108. No signs are prescribed in the Protocol to give these warnings. We see no need to distinguish between a ford and a deep ford since the depth of water would in any case vary with the seasons and would be recorded on the depth gauge which should invariably be used with the sign we recommend at figure 60.

Try your brakes (Regs. 140)

109. Owing to the possibility that brakes, after immersion in water, may temporarily fail, we consider this warning most important for a driver after passing through a ford. So as to avoid the need for a separate sign we recommend that the sign at figure 61 be used on the reverse side of that at figure 60.

Arrows showing sharp deviation of route (Regs. 142, 143 and 144)

110. The Protocol prescribes informatory and mandatory arrows but makes no provision for a warning arrow. Nevertheless, we believe that at exceptionally sharp bends advance warning signs and carriageway markings are not enough and we recommend use of a black and white chevrou-marked barrier, as at figure 40. The white sections should be reflectorised. We recommend that these chevrons should also be placed on roundabouts liable to be approached at high speed opposite the entry road and under the mandatory sign referred to in paragraph 56.

Two way traffic (Regs. 145 and 146)

111. These signs are used to indicate resumption of two-way traffic on a single-carriageway, after a stretch of dual-carriageways. In view of the number of short stretches of dual-carriageways in this country, and the increased vehicle speeds which these generate we regard it as most important that drivers be effectively warned before they return to a single-carriageway. This risk is especially serious where dual-carriageways are so widely separated that one cannot be seen from the other.

There is, however, no Protocol equivalent and we have considered whether two arrows on a rectangular blue informatory sign would be adequate. But we have come to the conclusion that the warning connotation is necessary. We therefore recommend the use, shortly before the end of the dual-carriageway, of the sign at figure 42 followed where the single-carriageway begins by the sign at figure 43, which should if necessary be repeated. Where there is need to give warning of two-way traffic on a single-carriageway which crosses a dual-carriageway we recommend the sign at figure 44.

School (Regs. 147)

Children (Regs. 148)

112. The Protocol states that the *Children* sign which it prescribes shall be used as considered necessary 'as the approved sign to places frequented by children such as a school or a playground'. We see no need for us to continue using two different signs and we recommend adoption of the sign at figure 50. We think, however, that the difference between the risks near schools (where danger exists only when children are going to and from school) and near

playgrounds (where children may be on the carriageway at any time) should continue to be indicated and that this be done by the use near schools of the supplementary plate shown at figure 50a.

The effectiveness of school signs, however, suffers seriously from the combination of two circumstances: their very widespread use, and the fact that the hazard to which they refer exists only during a very small proportion of the day. A school crossing patrol is a much safer precaution but cannot always be provided. We think that experiments should continue with the object of discovering some device with great impact which operates only when the children are crossing.

Children crossing ahead (Regs. 149)

113. This sign has been used on roads not subject to a speed limit to give warning that a school crossing patrol is in operation. We recommend that on such roads the plate at figure 50b should be used below the sign at figure 50.

Pedestrian crossing ahead (Regs. 150)

114. Where, on high speed roads or because of inadequate visibility it is necessary to give drivers advance warning of the presence of a pedestrian crossing, we recommend that the sign at figure 51 be used supplemented by the plate at figure 72.

Signals ahead (Regs. 151)

Traffic signals ahead (Regs. 152)

115. We see no need for two signs and recommend the use of the sign at figure 52 wherever it is necessary to give drivers advance warning that they are approaching traffic signals, irrespective of the form which these signals take. A plate as at figure 72 should be used with this sign.

Cattle (Regs. 153) and Stray animals (Regs. 154)

116. Animals may be encountered upon the road whilst they are being driven from one field to another or they may stray onto it because the road is unfenced. In either circumstance we consider that drivers need some indication of the type of animal which they are liable to meet. We therefore recommend that where the danger of animals justifies a warning the appropriate sign as shown at figure 54, 55, 56 or 57 should be used; when erected on unfenced roads the signs should be supplemented by a plate as at figure 70. We think, however, that use of these signs should continue to be centrally controlled by the Minister to ensure reasonable and uniform use and particularly to prevent proliferation to an extent which might invalidate their usefulness.

Cattle grid (Regs. 155)

117. There is no provision for this in the Protocol. A warning sign is, however, necessary in this country and we recommend the sign at figure 63. If the by-pass to the cattle grid for animals and horse-drawn vehicles is entered at some distance from the grid we recommend that the sign be placed at the entrance and be supplemented by the plate at figure 63a.

Road liable to subsidence (Regs. 156)

118. We have asked ourselves what action a driver is expected to take when he sees this sign. In cases where general slight subsidence is already in progress the road surface will presumably be uneven. The appropriate warning for this seems to us to be the sign for *Uneven road* (figure 47), supplemented, if appropriate, by a plate giving the distance over which unevenness is to be expected (figure 70).

In places where there is material danger of the road subsiding it should presumably be closed to traffic but if the danger exists only as a remote possibility we do not consider that a warning sign would serve any useful purpose. We do not overlook the relatively wider danger of road subsidence in mining areas but we hope that measures can be taken other than the vague and alarming traffic sign at present prescribed.

Temporary surface (Regs. 157)

119. We see no need for this sign and recommend instead use of the temporary sign at figure 137. It should be used either when there is an obstruction or when there is simply a rough or unfirm surface requiring reduced speed.

Road works signs (Regs. 159 to 165)

120. We have set out in paragraphs 192 to 198 our suggestions for a single and homogenous system of warning devices for road works.

Homes for the aged, blind and disabled

121. Our Regulations do not prescribe a sign to indicate to drivers that they are approaching old people's homes or homes for the blind or otherwise disabled, nor is there a Protocol sign for this purpose. But requests are frequently made for signs of this type and we have considered them.

Experience shows that where a sign is erected to draw attention to conditions which are not constant, it is soon likely to be ignored. The occupants of these homes do not cross the road at any particular times of day and more often than not they do so singly, as other pedestrians would. We think that the elderly and infirm might find themselves in greater danger if they put their faith in the protection of signs than if they depended upon their own caution. We therefore recommend against the introduction of signs for old people's homes and similar institutions where crossing is spasmodic.

Overhead cables and load gauges

122. With the extended use of bare overhead conductor wires in railway electrification schemes, the number of places where live wires cross roads is increasing. Safety gauges with warning bells are sometimes provided over these roads to warn drivers of vehicles with high loads, but roadside warning signs are not at present prescribed in the Regulations and, since in this country prohibitory Orders do not normally specify a vehicle height limit, the prohibitory height limitation Protocol sign cannot be used. In view of the danger we think that roadside warning signs are very necessary and that the same sign should give warning of the presence of a gauge where this exists. There is no Protocol equivalent and we therefore recommend that the sign at figure 65 be erected at and in advance of railway level crossings where there are overhead live wires.

On a plate below this sign should be stated the permissible height of the loaded vehicle to avoid danger and if a gauge exists this should also be indicated in the plate below the sign in advance of the gauge as in figure 65a.

Slippery carriageway

123. The Protocol prescribes a sign to indicate 'the approach to a section of the carriageway which, under certain conditions, may have a slippery surface'. Such conditions would include a carriageway worn smooth and in need of resurfacing or one which, for example, is liable to be made slippery by clay from the wheels of farm tractors. Ideally, no permanent sign should be necessary in the first instance since road surfacing should, and in this country probably would, be carried out as soon as it became slippery. This may, however, be a counsel of perfection and we would think this sign would be useful in the United Kingdom to warn against certain road surfaces, especially on bends, and that it should therefore be prescribed. We think it should also be used where road surfaces are liable to be fouled, for example, by agricultural or industrial operations. We have referred to this also under temporary signs (paragraph 206). We recommend adoption of the sign in the form shown at figure 53 for limited use in circumstances which should be defined by the Departments.

Low flying aircraft

124. A Protocol sign for this has recently been adopted. It is to be used to give warning that aircraft taking off or landing at an airfield may fly low over the road. In such circumstances, or where sudden aircraft noise near a road may startle drivers, we recommend use of the sign at figure 67.

Quay or river bank

125. Where a road leads to a quay or river bank we recommend use of the sign at figure 59, which is similar to the Protocol sign recently adopted.

Falling rocks

126. On roads where there may be danger from falling rocks we recommend the use of the sign at figure 68 which has also recently been adopted for inclusion in the Protocol.

Sudden side winds

127. It has recently been agreed by the Working Party to the Economic Commission for Europe that warning of sudden side winds should be given by a wind sock, and that wherever possible this should be placed so that it can be seen by drivers from some distance. Where this is not possible, advance warning of the existence of the wind sock should be given by a sign containing the appropriate symbol within a red triangle.

We believe that both these signs would be useful in this country and we have suggested at figure 66 a design for an advance warning sign. The symbol should be reversed where the prevailing wind is in the opposite direction.

Other danger

128. The Protocol prescribes a sign containing a vertical black bar symbol as a warning of any danger for which there is no specially designed sign. It makes

provision, however, for an inscription defining the danger to be substituted for this symbol. We have already followed this course in our recommendations for the signs at, for example, figures 60 and 62. Nevertheless we can envisage circumstances in which this Protocol sign would be useful and we therefore recommend that it be adopted in the form shown in figure 69.

We consider the exclamation mark to be more arresting than the Protocol symbol. This sign should be supplemented by a plate as at figure 69a indicating the nature of the danger.

Reflectors to indicate the edge of the carriageway (Regs. 158)

129. This sign, which takes the form of a circular cluster of reflecting studs, is mounted on a post between 2 feet 6 inches and 4 feet 6 inches above the level of the carriageway. It gives a useful indication of the line of the carriageway on bends or where the ground falls away beyond the verge and it can also be used to mark obstructions near the kerb. Red reflectors are used to mark the nearside edge of the carriageway and white reflectors the offside edge. We recommend the continued use of this sign but suggest that it should be permissible for it to have a rectangular shape of the same area in reflecting material. Where a post is specially provided for the sign it should be coloured in black and white horizontal bands.

It would be helpful if these signs were referred to as 'hazard markers' to avoid confusion between them and the much lower markers used on motorways and some other roads. The latter have proved to be very helpful to drivers, especially in fog, and we recommend that wider use be made of them particularly on Primary roads but trials will be necessary to determine the best design, appropriate siting and correct spacing.

C. Informatory Signs

130. Protocol informatory signs are basically rectangular. We consider them under two main headings—directional signs and others.

(a) Directional signs

131. The purpose of directional signs is to enable drivers to find their way to their destination. There are three kinds:—

- (i) advance direction signs, which give a driver information as to his route *before* he reaches a road junction;
- (ii) direction signs, which give route information *at* a junction; and
- (iii) route confirmatory signs, which give confirmation *after* a junction as to the identity of the route.

Origin of present system

132. Our present directional sign system derives basically from the Report of the 1933 Traffic Signs Committee who recommended *inter alia*, that map type advance direction signs should be introduced, with route numbers and place names displayed in panels; that route numbers should be placed above place names and that numbers should have a height three times greater than the letter height of the place names; lastly, that chequer symbols should be employed to show, where appropriate, that the route mentioned is reached indirectly.

Following the recommendations of the 1944 Traffic Signs Committee this system was modified by reducing the size of route numbers to $1\frac{1}{2}$ times the height of the letters of place names; by the addition to advance direction signs of map type symbols to indicate roundabouts, dual-carriageways and fly-overs; by introducing three colour distinctions—a yellow background for advance direction signs on through routes in urban areas, a blue surround for local destination signs in urban areas and a black surround for them in the country. It also provided for the use of stack type signs where insufficient space was available for the map type.

The influence of motorway signs

133. With the coming of motorways a new conception in directional signing was introduced. In accordance with the recommendations of the Anderson Committee lower-case lettering was used, panels were discarded and place names were set above route numbers. The adoption of a dark background enabled the white legend to be reflectorised and much larger signs to be used without detriment to amenity. The signs carried letters considerably larger than those hitherto permitted on all-purpose roads.

Later, when new by-passes were built to near-motorway standards, directional signs in motorway style but with green backgrounds and slightly smaller letter heights were erected on these roads by the Ministry of Transport. The green background was adopted, after experiments with other colours and other shades of green:—

- (a) to distinguish these all-purpose roads from motorways. This was important owing to the types of traffic which are excluded by law from using motorways and the special rules of driving conduct which apply on them;
- (b) because by day green was thought to harmonise normally with the rural environment; and
- (c) because a dark background had the considerable economic advantage that only the legend needs to be reflectorised.

Requirements of the Protocol

134. The requirements of the 1949 Protocol in regard to advance direction signs and direction signs are, broadly, that the signs should be rectangular in shape (the direction signs being pointed at one end) and that a light legend on a dark ground, or vice versa, be used. Otherwise, the Protocol imposes no restrictions upon choice of colour, lettering or design.

Criticisms of present signs

135. The advance direction signs now used on most all-purpose roads in the United Kingdom are currently criticised mainly because the place names are too small to be read at the speeds of modern traffic and also because they tend to be sited too near to the junction referred to and to be mounted in some cases unnecessarily high. Direction signs at junctions are also thought in many cases to be too small and too high. The main comment on route confirmatory signs is that not sufficient are provided. Lack of continuity of place names and inadequate information about mileages are further common complaints.

We find ourselves very much in agreement with these views. For example, we accept the findings of the Road Research Laboratory that the use of panels on advance direction signs has resulted in excessive compression of the legend

and waste of sign space. While place names on map type signs without panels must obviously not be overcrowded if they are to be clearly seen to be related to the route symbols, we think that by careful design this can be avoided.

General changes advocated

136. We have, therefore, considered what changes should be made in our present system of directional signing. In this country where the road pattern is so complicated, we think it would assist travellers in finding their way between important towns if a system of Primary routes other than motorways was established, the roads in which would be clearly distinguished by having directional signs of a particular colour. Moreover, we foresee that this distinction might eventually enable a code of improved driver conduct, aimed at improving traffic flow and safety, to be applied generally to these Primary routes. This might, for example, forbid parking except where it is specifically allowed and also all U-turns and stopping within a given distance of a junction. Such general measures would obviate numerous local regulations and would lead to greater uniformity in the enforcement of traffic regulations throughout the country.

Motorway style signs modified as mentioned below and with white lower-case lettering on a green background would be extended so as to be the main distinguishing feature of this new national Primary route system. For all other roads we recommend that directional signs should carry legends in black on a white background, a colour combination which has merit for the smaller signs which would be required on some of these roads because of its good target value; otherwise the signs should be in the same style as those recommended for Primary routes. In all cases letter heights and consequently sizes of directional signs should be based upon vehicle speeds and the layout of the roads on which they are erected.

The selection of Primary routes

137. We think that the selection of roads to form the Primary route network is best left to the Departments concerned in consultation with highway authorities. For their guidance we recommend that the network should include:—

- (i) roads carrying a considerable volume of medium and long distance traffic;
- (ii) roads which avoid urban centres;
- (iii) roads of traffic importance for the area concerned;
- (iv) such additional roads as are necessary as link roads so as to form a coherent national network.

It seems to us that if these criteria were adopted the resultant network of Primary routes would consist predominantly of trunk roads and class I roads. Obviously it would be necessary, in process of selection, to consider whether certain roads should not be added or subtracted. It would also be necessary to keep the system under constant review so as to meet the changing needs of traffic.

Primary routes in urban areas

138. Although it seemed to us desirable that Primary routes should in principle avoid city centres, it was also clear that this would be possible only in cases where complete ring or orbital roads exist. In the much more frequent case where a town is by-passed on one side only, Primary routes must continue

into the town to join up with other Primary routes entering it from the side on which there is no by-pass. Obviously, these urban Primary routes should be kept as few and as simple as possible and retained only until such time as they can be eliminated.

Colour of Primary route signs

139. It was for the reasons given in paragraph 133 as regards motorway signs that we felt a dark background should be used for directional signs on Primary routes. Blue being reserved for motorways was not available. We observed the experimental use of black in Oxfordshire but the majority of us thought that this was too funereal for general use and also that it lacked target value when used for small signs. After considering other colours we concluded that green held most promise.

A considerable number of experiments were carried out for us in built-up areas to determine whether signs with a green background would have a sufficient target value in that environment, and we are satisfied that they would. In reaching this conclusion we took into account that speeds in these areas are not high, that the white legends and route symbols which we recommend have themselves a considerable target value, and that where there is street lighting all advance direction signs should have independent direct lighting at night. We considered the possibility of yellow. Though this would have been very visible in urban areas and for this reason some of our members preferred it, most of us thought it unacceptable aesthetically; and it would also have involved discontinuity in the colour of directional signs on Primary routes which we thought it important to avoid.

After experiments with heavier route symbols and white borders it was felt that green background signs would have a satisfactory target value in urban areas as well as ensuring continuity.

140. We found considerable difficulty, however, in agreeing on the appropriate shade of green for the background. Our problem was to find a shade which was light enough to be clearly recognisable as green in varying conditions of light and one which would be adequately conspicuous in urban and rural areas whilst not being offensive on amenity grounds whatever the nature of the background against which it would be seen. After a great deal of thought and experiment with various shades of green in many different circumstances we finally chose British Standard colour 2660 No. 6-074. This is the colour which has already been in use on the Stamford by-pass since October 1960 without evoking adverse comments. To the majority of us this seemed on balance to be the most satisfactory shade of green for use in urban as well as rural environments, on dark days and on bright, and under varied conditions of illumination.

Four of our number however (Messrs. Jack Howe, J. M. Richards, Peter Shephard and L. Hugh Wilson) had reservations about the use of green, on amenity grounds and especially in relation to the countryside. The only green they were prepared to accept was British Standard colour 2660 No. 6-068, a darker and more muted shade than that favoured by the majority and one of the several shades with which the committee conducted full-scale experiments. These four members were convinced that the green chosen by the majority would have a damaging effect on many types of landscape and on architecturally noteworthy town and village streets, and they saw no practical disadvantages

in the darker green that would need to be set against their preference for it on amenity grounds. In their opinion it had, when surrounded by the white border proposed, adequate target value both in urban and rural settings, was a more pleasing colour in itself and would be more readily distinguishable from the greens commonly used on shop-fronts, advertisements, vehicles and the like. By providing a greater contrast in tone it also, they thought, made the message carried by the sign easier to read.

The majority of us, however, were firmly of the opinion that this shade of green was too dark to be distinguishable from black in failing daylight and during the many dark days which occur in a British winter. It did not show up sufficiently clearly as green, if at all, under external illumination. Finally the improved contrast with white lettering claimed for the darker green was not shown by experiment to be significant.

Lettering

141. The basis for our selection of the forms of lettering illustrated at figures 1, 2, 4 and 5 is set out in paragraphs 40 to 44. The wording on directional signs should invariably be in lower-case lettering with initial capitals and the route letters in upper-case.

Letter height, together with sign layout and positioning, is an important factor in ensuring that the necessary information is conveyed to drivers clearly and in good time for them to slow down or make any appropriate manoeuvre. Letter sizes for directional signs will depend on vehicle speeds at the site of the sign and the distance of the sign from the driver's path. Following the principles upon which calculations were made to determine the letter height for directional signs on motorways and dividing all-purpose roads into four groups according to vehicle speeds and carriageway widths, we recommend that letter heights for directional signs be as set out in Appendix V.

We recommend a difference of two inches in the height of the letters used in each group. This is a convenient interval and it would be impracticable for the purpose of making Ministerial Directions, or indeed for the production of signs, to have numerous variations of letter size to accord with local variations in vehicle speed. Nevertheless, the letter size of directional signs should vary with vehicle speeds on the same road. For instance, when a Primary route passes through a speed restricted town the signs in the speed restricted area should have a correspondingly reduced letter size.

We also think it convenient and appropriate that the letter height for direction and route confirmatory signs should in all groups be two inches less than that on advance direction signs, except in the fourth group.

Variations in letter size on a single sign

142. We recommend that all the names on a directional sign be in lettering of the same size and that no reduction be made for places of minor importance. This will assist in making the whole sign readable at the same distance. In our view, reduced letter sizes should be used only for long place names which cannot be abbreviated or hyphenated and would otherwise require a sign wider than is consistent with good design or the space available.

Route numbers

143. We recommend that on all white on green Primary route signs route numbers should be yellow and that on all directional signs their height be equal

to that of the capital letters on the sign. The survey referred to earlier confirmed that route numbers are understood and relied upon by a considerable proportion of drivers and we believe that a distinctive yellow colouring will enable them to be picked out more easily. In the past, route numbers have been larger than the letters of place names. We believe that this is unnecessary and we recommend that the numbers and letters be the same height as the capitals of place names so that the whole message of a sign is legible at the same distance. This reduction in the size of route numbers relative to place names will save a certain amount of space on the sign, with reduction in costs and gain in amenity.

Route symbols

144. In order to give a driver as much help as possible in selecting his route, we recommend that the route symbol used should indicate the essential features of the lay-out of the junction or roundabout. We recommend that the relative importance of the intersecting routes should be indicated by difference in thickness of the arms of the symbol. Primary routes should be shown by a route symbol of 6 stroke-widths, class III and unclassified roads by one of $2\frac{1}{2}$ stroke-widths, and all other classified roads by one of 4 stroke-widths. A stroke-width is the width of a vertical stroke in a capital letter of the appropriate alphabet.

Chequer symbol

145. The use of the chequer symbol to denote routes which may be joined indirectly is clearly not possible in its present form on signs without panels. In considering whether such a symbol is still needed we asked the Social Survey to investigate the extent to which its meaning is understood. They reported that the majority of drivers have some understanding of and therefore derive some help from the chequer symbols though only a small proportion fully understand its meaning. This led us to the conclusion that it is of sufficient usefulness to justify its retention in some form.

After a number of experiments we concluded that destinations not lying on the numbered route indicated first on the advance direction sign should be distinguished by having brackets round the route number. These should be in yellow on green background signs and black when the background is white, so that they are of the same colour as the route number. Brackets should also be used where appropriate on other directional signs.

The selection of place names on directional signs

146. We have considered the criteria to be adopted in determining what place names should be included on directional signs and recommend that on Primary routes they should normally include only the next place of traffic importance since on these high speed roads it is essential to reduce the legend on a sign to the minimum. Exceptions will be necessary but should be made sparingly. A decision as to which places should rank as places of traffic importance should we think, rest with the Departments concerned in consultation with local authorities. This could be done at the same time as the selection of Primary routes and should lead to the establishment of a national network of Primary routes together with uniformity in the selection of place names.

On directional signs on other than Primary routes it will be less practicable and desirable to confine place names to places of traffic importance and on

these slower roads more place names on a sign will be acceptable. The principle should nevertheless be followed that a place once mentioned on any class of directional sign should continue to be shown on that class of sign until it is reached.

On purely local directional signs no difficulty arises in the selection of place names.

Design rules for directional signs

147. Since it is not possible for us to design every directional sign individually our designer, Mr. Jock Kinneir, has prepared rules which should govern the design of these signs, both map and stack type. These are in Appendix VIII. It will clearly be necessary to amplify and modify these rules in the light of experience during the period before new Regulations are issued. However, in due course a definitive set of rules will be issued which will then have to be followed by highway authorities and signmakers working on their behalf.

Sign types

148. Stack type advance direction signs, on which arrows are ranged right or left of place names shown in panels one above the other, can usually achieve the same legibility as map type signs within a somewhat smaller area. We think, however, that this potential saving is more than outweighed by the great value of the visual indication of the nature of the junction ahead which is given by the route symbol on a well designed map type sign. We considered whether stack type advance direction signs might be used regularly at simple junctions, but we think that the image of a junction which is presented to drivers by a map type sign is so useful a safety measure that we recommend the use of stack type advance direction signs (figures 85 and 88) only where the roadside space available is not wide enough to admit a map type sign. At all other sites advance direction signs should be in map form (figures 74 to 84, 86 and 87). Stack type signs should, however, continue to be used for advance direction signs to purely local destinations (figure 89).

Standards of directional signposting

149. Except on trunk roads it has hitherto been the practice to leave it to the discretion of local highway authorities to decide whether a road junction merits a full complement of directional signs. In the interests of uniformity more guidance on this should be given to local highway authorities by the Departments. We suggest that such guidance should take into account the speed and volume of traffic using a junction together with the importance of the junction in relation to the national and local road networks. These factors are, of course, variable and the standard of signing at each junction should therefore be kept under review and improved to include all three elements (advance direction sign, direction sign and route confirmatory sign) where changing conditions make all of them necessary.

Advance direction signs

150. We recommend that on Primary routes advance direction signs (other than local advance direction signs, to which we refer elsewhere) should have white place names and yellow route numbers on a green background even

when the place referred to is not on a Primary route. When a place is reached via a motorway the motorway route number should be on the advance direction sign in yellow (figure 81). When a place indicated is on a road leading to a motorway the motorway route number should be in yellow and in brackets. We think it important that directional signs on all-purpose roads should be as helpful as possible in indicating the direction to motorways and these indications should start at greater distances from the motorways than is at present the case.

On all-purpose roads other than Primary roads advance direction signs should have black lower-case letters with initial capitals and black route letters and numbers on a white background. When a place referred to on these signs is reached via a motorway the motorway route number should be shown in black after or below the place name. When a place indicated is on a road leading to a motorway the motorway route number should likewise be set below it but in brackets.

In order not to overcrowd advance direction signs place names should, as far as possible, be limited to one in each direction. On Primary routes this should be the next place of traffic importance along the immediate route. Places of lesser importance can be indicated on a separate local advance direction sign placed nearer the junction. When on the main advance direction sign it is desired to show places off the immediate route, the name on the immediate route should be placed first and the name or names off that route next with the appropriate route numbers enclosed in brackets (figures 78, 82 and 87).

On less trafficked roads where a local as well as a main advance direction sign would not be justified, it will more frequently be necessary on whichever sign is provided to show more than one place name for each direction and the places selected will then include places of only local importance.

The word 'Airport', or the name of the airport, may be regarded as a place name and shown on advance direction signs.

Local advance direction signs

151. Existing local advance direction signs have a black surround in the country and blue in urban areas. We think that some distinction between local and other advance direction signs is useful but we see no object in the present colour distinction between town and country. We therefore recommend that all local advance direction signs should have a blue border of 4 stroke-widths; the legend should be in black on a white background (figure 89).

As recommended above (paragraph 148) local advance direction signs should invariably be in stack form and this will be another distinguishing factor.

Direction signs

152. We recommend that the Protocol requirement of a rectangular sign pointed at one end should be followed for direction signs (figures 90 to 92, 94 and 95), that is signs placed at the actual junction. These signs should repeat the place name or names and the route number shown on the advance direction signs, if any, and give the mileage unless there is a route confirmatory sign when it should be shown on this and not on the direction sign. Direction signs should be set at the average eye level of drivers in a private car and placed at each exit from the junction if this is wide enough. If there is not sufficient room at the junction for these separate signs they should be mounted on a single post. In this case all signs should if possible be visible from each access road and one

sign should not obscure another as is so often the case at present with finger-post signs. Place names should be in lower-case letters and the signs should be reflectorised if they are not directly lit.

In some rural areas finger-post signs are surmounted by circular finials containing the name of the parish in which they are situated and also the grid number of the national survey map. We understand that this additional information has proved helpful to road users in finding their bearings and it seems to us that wider adoption of this practice would be appreciated.

On Primary routes direction signs as distinct from advance direction signs should be white on green with yellow route numbers if they carry the name of a destination reached via a Primary route, black on white with black route numbers if they refer to a non-Primary route. Direction signs to motorways should normally carry only the word 'Motorway' and the appropriate route letter and number without place names. The legend should be in white motorway characters on a motorway blue background (figure 95). At any junction where all-purpose roads diverge to different junctions with the same motorway the direction signs should indicate not only the motorway route number but also its destination. We recommend the sign at figure 92 to indicate the route to an airport.

Where the advance direction sign carries more than one name in any direction these should all be repeated on the direction sign at the junction, the route number of the second or subsequent names being also placed in brackets where it is not on the direct route.

Urban direction signs

153. There are at present too many junctions in urban areas without any directional signs. This situation dates from an epoch when traffic volumes were far less and we recommend that urban highway authorities should bring their signing up to the standard required by modern traffic conditions.

Route confirmatory signs

154. The purpose of route confirmatory signs is, as the name implies, to give drivers confirmation that they have taken their intended route out of a junction. They can also be used to give more information about the places which lie ahead than can be included on other directional signs. Route confirmatory signs should primarily repeat the information on the advance direction and direction signs, and add the mileage to the place name or names repeated. But where the road continues for a considerable distance under the same route number, route confirmatory signs should also include up to three, or exceptionally four, names and distances of places on the numbered route other than those shown on the advance direction sign provided they are within 150 miles or so. This distance could be greater in the case of London and other main centres. These names should be given in the order in which they will be reached and once mentioned they should continue to be shown on route confirmatory signs till they are reached. Places off the numbered route should only be included if they are major towns or cities and are within approximately 15 miles of the route; in this case, both the name and the mileage should be in brackets as shown in figure 93. In the interest of continuity the signs should show only the names of places which will be found on advance direction or direction signs further along the road.

All mileages should be shown by means of figures alone; we do not think that the letter 'm' or the word 'miles' is necessary.

Confirmatory signs should be of the same colour combination and letter height as direction signs. Wherever possible they should be placed at eye level and as far as possible at points where drivers will have time and opportunity to absorb their message, but they should normally not be less than 75 yards nor more than 150 yards beyond the junction.

We advocate that route confirmatory signs should be used after any junction at which traffic volume is sufficient to justify a main (as distinct from local) advance direction sign.

Ring roads

155. Continuity of ring roads is not always obvious and we recommend that the sign shown in figure 96 should be mounted at frequent intervals along them, the frequency depending on the course of the route. We recommend this sign in the absence of any internationally agreed sign for this purpose.

Use of local junction names on directional signs

156. Road junctions are quite frequently known by special names. These may be nationally known such as 'Scotch Corner' or only locally known such as 'Staples' Corner' on the London North Circular Road. It has been urged that these should be marked. We agree and suggest that this be done by the addition of a suitably designed rectangular plate to the upper edge of the advance direction signs before the junction. We think it must be left to the highway authority to decide at what point a local junction name becomes sufficiently well known to justify marking in this way. If there is any doubt, it should be omitted in the interest of keeping signs as simple and clear as possible.

When junction names are used they should be in capital letters, as are the legends on place names signs (see paragraph 157), and should be in the same colour combination as the rest of the sign.

Place name signs

157. The names of towns and villages are at present widely indicated by informatory signs with black capitals on a white rectangular plate. These signs are useful, they conform with the Protocol, and for economic reasons we recommend no immediate change. We advocate, however, that when new signs are needed or existing signs require to be renewed the form of lettering shown at figure 4 should be used, the letter height being that of the initial capitals of the direction signs on the same road. New signs should not include mileages and forward destinations as is now sometimes done (*Regs. 462*). When the place named is part of a town and it is desired to show the name of the town as well, this should be in smaller letters above the place name but not underlined as at present (*Regs. 463*). Place name signs should be sited at the beginning of the built-up area and not on the boundary of the borough, urban or rural district, or parish as this may often be some distance from the town or village itself and can cause confusion.

In urban areas it is often found more convenient for the place name of a suburb to be displayed on a plate above an advance direction sign on or near the boundary of the district. If so the plate should take the same form as that used for local junction names (see paragraph 156).

158. County boundary signs and those indicating a national border are also of interest and often of assistance in following a map. We recommend that they be prescribed as traffic signs in similar form to place name signs. Local highway authorities frequently display their own or national crests on place name and boundary signs and we recommend that this practice be permitted to continue.

Footpaths and bridleways

159. We have considered only those signs which are erected at the junction of footpaths with all-purpose roads.

We recommend retention of the existing public footpath signs (*Regs. 466 and 467*) which may be so varied as to make a clear distinction between 'Footpaths' and 'Bridleways'. Such distinction is important because legal definitions have placed limitations upon the classes of traffic which may use these routes. Present Regulations require all footpath and bridleway signs to indicate destination and mileage and we understand that complaints have been received because this information is not always given. We think it should be given as a rule, but there may be exceptions where no named destination is possible.

Roads used as public paths

160. Throughout the country there are many old roads which have fallen into disrepair and some have been signposted by highway authorities as footpaths or bridleways. In the main these are the roads indicated as 'roads used as public paths' on the latest Ordnance Survey maps. Whilst it is still legal for motor vehicles to use these roads, the footpath or bridleway signs tend to indicate that they are reserved for pedestrians or horse riders, who, we understand, have sometimes expressed resentment at their use by motors. We therefore consider that black on white direction signs should be used on these roads, as no other minor roads, and we suggest that consideration be given to adding the words 'Cart track' to indicate their nature.

(b) Other informative signs

End of 20 m.p.h. limit (Regs. 401)

161. As recommended in paragraph 76 in connection with *Regs. 327*, the end of a speed limit should invariably be indicated by the sign at figure 28.

Cyclists only (Regs. 402)

162. Tracks provided specially for the use of cyclists should be indicated by the sign at figure 100. Nowhere in this country, so far as we know, has it yet been made compulsory, as it often is abroad, for cyclists to use a cycle track rather than the carriageway. If and when Orders are made to this effect, they should be expressed by a similar sign but in the mandatory form of a blue disc instead of a blue rectangle.

No through road (Regs. 403)

No through road for motor vehicles (Regs. 404)

163. We recommend that the sign at figure 101 should be erected at the entrance to a road from which there is no exit. If the absence of an exit affects

pedestrians as well as vehicular traffic we suggest that the words 'Cul-de-sac' be included in the street name plate. Where it is considered essential to give advance notice of a 'no through road' we recommend that the sign at figure 102 be used on the main road, with appropriate variations to the symbol so as to show the road layout; we urge that sparing use be made of this sign to avoid unnecessary clutter.

Unsuitable for motor vehicles (Regs. 405)

164. There is no Protocol sign for this and we recommend that words continue to be used but in the form shown in figure 103.

One way street (Regs. 406)

165. We recommend the sign at figure 99 (see paragraph 59).

Alternative route (Regs. 407)

166. We recommend that the same words be used but in the form shown at figure 104.

Dual carriageway ahead (Regs. 408)

167. Since we have been unable to devise a reasonable symbol for this we recommend that words continue to be used as illustrated at figure 105.

Dual carriageway (Regs. 409)

168. Words seem quite unnecessary here and we recommend the use of a mandatory arrow as shown at figure 14. This sign should be placed at the point of the dual-carriageway's central reservation and supplemented by a *No entry* sign (figure 15) wherever there is a danger of drivers attempting to enter the wrong carriageway.

Keep to nearside lane except when overtaking (Regs. 410)

169. As this should be a general rule for all driving we hope that this sign can soon cease to be used. But so long as it is required we see no alternative to its being expressed in words, which should be in white capital letters on a blue ground.

250 yards ahead. No entry (Regs. 411)

3 miles ahead. Weight limit 10 tons (Regs. 412)

270 yards ahead. Prohibited all vehicles unless requiring access to premises or land adjoining the road (Regs. 412A)

130 yards ahead. No right turn (Regs. 413)

170. We considered whether for these signs Protocol symbols could be used in conjunction with rectangular plates beneath indicating the distance ahead at which the prohibitory symbols apply. But we concluded that for the sake of clarity prohibitory symbols should not be used except at the point at which they apply and where penalties can be imposed for ignoring them. We therefore think that advance notice of these prohibitions must be given in words but that the message should be kept as short and simple as possible. An example of this type of sign is given at figure 105.

Lay-by 1 mile ahead (Regs. 414)

Lay-by (Regs. 415)

Lay-by with distances to places ahead (Regs. 416)

171. In our section on waiting restriction and parking signs (paragraph 85 (vii)) we have recommended the use of the sign at figure 115 to indicate designated street parking places. We consider that it should also be used in place of the *Lay-by* sign (Regs. 415). Where it is desirable to give the distance to the lay-by this should be given by a plate (figure 71 or 72) below the sign.

Since we have recommended more frequent use of mileages on direction signs and route confirmatory signs we see no need for them to be given at lay-bys. Where a lay-by is divided from the carriageway by a wide verge the sign (figure 115) should include a horizontal arrow below the letter P and be placed at the entrance to the lay-by.

Passing place (Regs. 417)

172. The object of this sign is to indicate from a distance to drivers approaching each other the point where a normally single track road becomes wide enough for them to pass. The diamond shape of the existing sign greatly assists drivers in recognising it from a distance and as the sign is of limited application only we recommend no change.

Pass either side (Regs. 418)

173. We recommend the sign at figure 97. We think it illogical and unnecessary to place these arrows in a blue mandatory circle, as is sometimes done on the Continent, since the sign is not mandatory but permissive.

Traffic census. Please stop at the census point (Regs. 419)

Traffic census. Please drive slowly past the census point (Regs. 420)

Census point (Regs. 421)

174. We recommend that these be indicated by the signs at figures 106, 107 and 108.

Public lavatories (Regs. 422)

Public urinal (Regs. 423)

Public conveniences (Regs. 424)

Ladies (Regs. 425)

Gentlemen (Regs. 426)

Women (Regs. 427)

Men (Regs. 428)

175. It could be maintained that signs to lavatories are entirely a local authority matter and should not be prescribed by central authority in Regulations concerning traffic signs. The whereabouts of lavatories is, however, very much a matter of concern to those travelling by road, a concern which is shared by local authorities in their quest to prevent a misuse of the roadside, and particularly the land adjoining lay-bys. It is therefore important to drivers and indeed to all road users, that the existence of lavatories near to public highways should be indicated with as much clarity as possible.

Since no internationally known symbol is available we suggest use of the word "Toilet" which we believe to be sufficiently well known abroad to be

understood by visitors as well as by our own people. We thus recommend that existing signs be replaced by those shown at figures 109, 110 and 111, the symbol of a male or female figure being used only where a distinction on the sign is necessary.

It would be helpful to road users if the signs were associated with parking signs where lavatories are near to parking places, for it is often necessary to find a car park before one can use a lavatory.

Service establishments (Regs. 468, 469 and 470)

176. We recommend no change in these signs which are of concern only to those wishing to find their way to the establishment named on the sign.

Ancient monuments (Regs. 471 and 472)

177. We think these signs adequate and recommend no change. The criterion for their use should be that the monument concerned is of considerable public interest and also that it is in the ownership or care of the Government.

We have considered whether signs on the highway should be prescribed or authorised for historic or otherwise notable houses in private ownership. It would be difficult to prevent proliferation of signs if all these places were permitted to have signs on the highway. We understand that for these reasons it has been the policy of the Departments to refuse to authorise such signs and we think this policy should be maintained. The requirements of tourism and travel can, we think, be adequately served by the provision of maps, guide books, leaflets, etc. indicating where these places are to be found: also by advertisements off the highway if the importance of the place is such that these can be conceded by the local planning authority responsible for authorising advertisements. Many well known or historic houses are already indicated in this manner.

Signs indicating National Trust properties are of a special category as the organisation is of national importance. We recommend that these signs continue to be authorised in strictly limited numbers.

Hospital (Reg. 473)

178. We recommend adoption of the sign at figure 112 which accords with the Protocol.

It is at present not clear to drivers what action they are supposed to take when they see a hospital sign. We therefore suggest that it is made clear in the Highway Code or other publicity that the action required is not only to take additional care but also to avoid all unnecessary noise.

General hospital (Reg. 474)

Station (Regs. 476, 477 and 478)

179. There is at present no uniformity of design for direction signs to railway stations, docks, bus stations, police stations, hospitals and cathedrals. The Regulations provide that where the station is one belonging to British Railways the sign may be in the colours customarily used by that body in the Region concerned. A number of signs indicating the direction to police stations which are located off main roads have been authorised, the words 'Police station' (with a directional arrow) being in white upper-case lettering on a blue rectangular background. Other signs seem often to have been erected by the organisation concerned.

Where these signs are needed they should be uniform in design so as to be readily recognisable. We recommend the form shown at figure 113.

Fire rendezvous point (Regs. 475)

180. We recommend no change in this sign which is little used.

Parking signs (Regs. 481 to 488)

181. We have referred in paragraph 85 (vii) above to the use of the sign at figure 115, a white P on a blue background, in connection with designated street parking places and in paragraph 171 to its use at lay-bys. The sign should also be used to indicate off-street car parks. It will often be necessary to give drivers directions to these car parks or information about conditions attached to their use. Where it is desirable to indicate the direction to a car park or to a coach park or to a garage this can be done by putting these words with a directional arrow on an informatory sign as figures 116 and 117.

Some highway authorities and other responsible bodies have discouraged the use of roadside verges for picnics by setting aside areas off the road for this purpose. We recommend that the plate at figure 115a be used with the parking sign to indicate the position of such sites advance notice of which should be given by the sign at figure 118. An arrow should be added to the plate at figure 115a if the picnic area is not visible from the road.

182. A square sign having a broad black horizontal band with a narrower white band above and below it is prescribed in Regulations* for use on roads in those areas outside the Metropolitan Police District where certain classes of vehicle are permitted to wait without lights after dark. We understand that these Regulations are under review and we therefore make no recommendations about changes in this sign; it seems to us, however, to be an unsatisfactory sign and quite out of line with the Protocol.

In (Regs. 489)

No exit (Regs. 490)

Out (Regs. 491)

No entry (Regs. 492)

183. These are for use on private and other premises near the highway. We recommend that the words be shown in the form at figures 119 to 122.

No reversing into street (Regs. 492A)

184. This is an elementary principle of good driving and we see no need for a sign.

Horse drawn vehicles and animals (Regs. 493)

185. See paragraph 117.

Pedestrian subway (Regs. 494)

186. Pedestrian subways will be increasingly needed and it would be convenient to have an internationally recognisable sign. There is none yet prescribed in the Protocol though a mandatory sign to indicate a compulsory way for pedestrians has been agreed for inclusion in a draft amendment.

* The Road Vehicles Lighting (Standing Vehicles) (Exemption) (General) Regulations 1956.

If the use of a pedestrian subway is made legally compulsory, the sign should be mandatory but as far as we know that is nowhere the case in this country. We therefore recommend that the sign be prescribed in the informative form as shown in figure 123.

Second train coming (Regs. 495)

187. The legend on this sign, which is used at half-barriered level crossings is visible only when internally illuminated. No change is recommended.

River names

188. A number of local authorities have already followed the Continental practice of showing the names of important or historic rivers by means of signs on or near bridges. The designs of these differ. Sometimes the name of the bridge as well as the river is included and also the county crest. We think these signs are useful and interesting and we recommend the sign at figure 131.

Telephone

189. We believe that it would be helpful to drivers, particularly on long stretches of rural road, if signs were erected indicating the distance to the nearest public telephone especially where it is in an inconspicuous position away from the road. The sign should be used sparingly but where it is needed we recommend that it take the form shown in figure 114.

Camping sites

190. Signs are frequently used on the Continent to indicate camping sites or the way to them. These signs can be helpful to tourists and may promote safety by preventing indecision in the minds of drivers seeking such sites. We therefore recommend that where signs are needed they should take the form shown in figures 124, 125, 126 and 128, the appropriate symbol or symbols being used for sites accommodating campers using tents or caravans.

Youth hostels

191. These signs too are frequently used on the Continent. Where signs are needed in this country we recommend that they be as shown in figures 127 and 128.

D. Temporary Signs

(a) Signs required by obstructions on the highway

Road works

192. The efficient signing of obstructions on the highway is clearly of the greatest importance to road safety. Road works are much the commonest form of obstruction and differ from the rest, such as vehicle accidents, breakdowns, landslip and soil subsidence, in being for the most part predictable and so allowing time for warning signs to be put up in advance.

193. At present the official requirements for signing temporary road obstructions are set out in two Traffic Safety Codes issued jointly by the Departments. One is concerned with all-purpose roads only, as distinct from motorways, but

confines itself to the signing of road works and does not refer to accidents or other emergencies. This Code specifies the use of 16 signs prescribed at *Regs. 159 to 165, 219 and 220*. The other Code deals with motorways. This covers fog, ice and accident, as well as road works, and requires the use of quite different signs. Some of these are Protocol signs but others use words although Protocol symbolic equivalents exist.

It seems to be unnecessary, and indeed undesirable, that there should be any basic difference in design between signs used to mark obstructions on fast roads and those used on slower roads. In the interests of immediate recognition by drivers there should be uniformity in the kinds of signs used. The differences should be only in size, siting and frequency of signs, and these will depend primarily upon different vehicle speeds of roads but also to some extent upon what proportion of the carriageway is obstructed. We thus see no need for two Traffic Safety Codes, and recommend that a single Code should be issued by Departments covering roads of all vehicle speeds.

194. Adequate Protocol signs are available and we think they should be used. In particular when a reduced speed is required we suggest that a speed restriction sign, stating the safe speed for the particular road, would be more explicit and helpful than *Slow*. The use of speed restriction signs for this purpose is common practice abroad though they have not yet been so used in this country. We also advocate that on high speed roads signs should show how far ahead the obstruction is and how much of the carriageway, and what part of it, is obstructed. The latter could be done by an indicator using hinged flaps.

By way of illustration we suggest the following sequence of signs to mark an obstruction by road works on the fastest type of road:—

- (i) *Road works* sign (figure 134);
- (ii) *Road works* sign, with a plate (figure 72) giving the distance to the obstruction;
- (iii) a flap-operated sign showing the width of the obstruction and its position in the carriageway;
- (iv) a combination of:—
 - (a) a temporary *Speed limit* sign (figure 27) indicating whatever speed is thought appropriate, and
 - (b) a *No overtaking* sign (figure 24)—if one lane only is open, or a *Road narrows* sign (figure 41)—if two or more lanes are open;
- (v) traffic cones deflecting traffic away from the obstruction and ending with a white on blue mandatory arrow (figure 14) at the point of the greatest encroachment (paragraph 214);
- (vi) reflectorised barriers having alternate red and white stripes to mark the limits of the obstruction; and
- (vii) a *Road clear* sign (figure 141) after the obstruction.

This number and sequence of signs would have to be adjusted in accordance with the type of road and its vehicle speeds.

The details and legal implications of a combined Code would have to be worked out by Departments and we have confined ourselves to offering this outline of principles which are somewhat different from those now being applied in either of the existing Codes.

195. In addition to the signs already mentioned we see need for drivers to be warned of loose chippings, wet tar, a temporary road surface, or a ramp, or

to be told that they may pass either side of an obstruction. We recommend that the signs at figures 135 to 138 and 97 be used for this purpose and set at an appropriate distance in advance of the particular hazard. It will also be necessary at times to warn pedestrians against traffic approaching from an unexpected direction; in such cases the sign at figure 139 should be used.

196. An obstruction by road works is not less dangerous because it is of short duration or because it is moved forward as the work progresses. These are not sufficient reasons for putting up fewer signs.

197. Authorities responsible for road works should ensure in advance that their contractors are fully aware of the requirements of the Code and should also make it a condition of their contract that the correct signs in relation to the speed value of the road are properly erected and afterwards removed. Penalties for breach of this condition should be enforced.

198. Where alternate one-way working is necessary past an obstruction on a single-carriageway road, traffic should be controlled by one of the following methods:—

- (a) traffic signals at extended obstructions or at small obstructions during times when traffic is dense;
- (b) manually-operated *Stop* and *Go* signs, mounted back to back on a portable post, at small obstructions of short duration provided traffic is not dense; or
- (c) the signs shown at figures 23 and 132 to indicate which direction of traffic flow has priority, at places where the more rigid control imposed by (a) or (b) is not justified (see paragraph 82).

We thus recommend that red and green flags should cease to be used.

The sign at figure 140 should be set at an appropriate distance in advance of the obstruction when traffic control is by method (a) or (b) above.

Accidents and emergencies

199. In many cases the first temporary signing of an accident or other emergency will probably be carried out by the Police using *Stop police* or *Police slow* signs (figures 142 and 143) or by motoring organisation patrols. In any case the first object should be to give as quickly as possible and well in advance of the obstruction a general warning of danger together with a command to reduce speed. Next, or preferably simultaneously, the obstruction itself must be very clearly marked. As soon as possible thereafter, and particularly if clearance of the obstruction is likely to take some time, standard signs as for road works should be used except that the *Other danger* sign (figure 69) should replace the *Road works* sign (figure 134).

200. In some Continental countries the difficult problem of quickly providing warning of an emergency is met by allowing drivers to place warning devices on the carriageway. In Italy, for example, certain vehicles are required to carry a triangular warning sign which can be placed on the carriageway not less than 50 metres in advance of an obstruction. We think that signs of this sort may be of help in reducing the risk of accidents at the scene of an emergency, particularly on motorways and other high speed roads. We understand that the Departments are considering the introduction of Regulations permitting

drivers to use these devices. If this is done we recommend that the sign be in the form of a red reflectorised triangle so constructed that it would not cause damage to any vehicle colliding with it. But these devices should in no way diminish the responsibility of the appropriate authority to provide signs conforming with the Code as quickly as possible.

201. It is sometimes desirable, particularly on fast roads, to give warning to drivers of patches of ice or fog. We recommend that the signs at figures 69 and 69a (but reading 'Ice' or 'Fog') be used for this purpose and that they be kept readily available for erection at short notice.

202. Finally, highway authorities should be reminded that in the last resort it is their responsibility to ensure that obstructions upon their own roads are properly signed and to ensure both that the signs are efficiently used and that they are never left up after the obstruction has been removed.

(b) Signs erected by the motoring organisations

203. The practice of motoring organisations putting up traffic signs may look at first sight anomalous. But the benefits which drivers derive from the signs is not confined to members of the organisations and there is great practical advantage to highway authorities in being able to rely on the large stock of temporary signs maintained by the motoring organisations and on the speed with which they can be erected when needed in an emergency. Examples are the signposting of alternative routes at peak holiday times and of the way to sports meetings and other special events, which is done in collaboration with the highway authorities concerned and the police. In many cases the signs provide a uniform, easily recognisable and reliable form of marking along a route which may pass through several highway authorities' areas. We therefore recommend that the motoring organisations be authorised to continue the practice of erecting temporary signs, and we see no objection to the continued use of their own badges and colour schemes for these signs.

We feel that the design of these signs could be improved, however, and we would urge the organisations to consider this in relation to the Committee's recommendations. We would emphasise that these signs should remain in position for limited periods only, normally for not more than six months, and that where they are erected pending the provision of permanent signs the highway authorities should ensure that the latter are available to replace them within this period. In some cases, however, it may be necessary for the signs to remain in position for longer periods, for example, in connection with experimental traffic schemes.

204. Signs indicating the whereabouts of the telephone boxes and patrol service centres of the motoring organisations are in a different category, and cannot be regarded as temporary. These have hitherto been treated as advertisements but since they are permanent signs on the highway we recommend that they should be prescribed as traffic signs.

(c) Signs erected by the police

205. Under Section 54 of the Road Traffic Act 1960 the police may erect any signs for the control of traffic provided that these comply with Regulation 23 of the 1957 Regulations and are not erected for more than 7 days. Under

Section 53 of the same Act the police can also erect any signs for the control of traffic in order to give effect to Orders made under the various Police Acts, provided the signs accord with Regulation 23. There is no time limit on these signs.

In practice we find that a number of signs provided by the police do not conform with Regulation 23. A particular example is the rectangular sign having the legend 'Police notice—Radar speed meters in use', which we observe is tending to increase. As the use of radar becomes more common we hope that no further need will be felt by the police for this sign and that any necessary warning will be given by general publicity.

There appear to be numerous varieties of police signs to indicate waiting restrictions and many do not conform with the Regulations. We think it important that the fewest possible types be used so that drivers can recognise them immediately and we think a blue pyramidal sign with white or silver lettering the most suitable portable sign for this purpose. We favour this shape because it presents a flat surface for the legend and it can easily be stacked. These traffic pyramids, like the traffic cones to which we refer in paragraph 214, should be so constructed as to be rigid and stable in wind or airstream caused by passing traffic. They should be between 2 feet and 2 feet 6 inches in height. When a fixed sign is required for longer periods a rectangular blue plate with white lettering may be used on lamp posts as is now done by some police forces.

Two signs, *Police stop* (Regs. 221) and *Police slow* (Regs. 222), are prescribed. We recommend that they be replaced by the signs at figures 142 and 143 which should be of a size convenient for carrying in patrol cars. Where it is more convenient to use one double-sided sign than two separate signs the *Stop police* sign may be placed on the reverse of the *Police slow* sign, in which case that part of the plate which is outside the circular red border should be coloured white and should not be reflectorised.

A temporary flashing beacon with a blue light is at present used by the police at the scene of accidents. This flashing blue light is combined with the *Police stop* or *Police slow* signs mentioned above. We recommend that the use of this type of beacon should be permitted.

(d) Signs erected by highway authorities

206. Highway authorities sometimes need to erect temporary signs, the most common being signs to indicate traffic diversions. We recommend that in future these diversion signs be in the form of direction signs with black lower-case lettering on a white background but including the word 'Diversion'. Care should be taken to ensure continuity of signing throughout the entire length of the diversion.

Where the authority provides a temporary mandatory or prohibitory sign pending the erection of a permanent sign, this should be in the form of the intended permanent sign.

Where the carriageway is slippery because it has been fouled by, for example, agricultural or industrial operations, every effort should of course be made to remove the danger quickly. But until this is done we recommend use of the sign at figure 53. We refer in greater detail to this sign in paragraph 123.

Any temporary warning signs should follow the Protocol. For example, warning of flood should be given by the sign at figure 60 with the word 'Flood' in black lower-case letters instead of the word 'Ford' within the red triangle.

(e) Other temporary signs prescribed in the Regulations

Stop for weight check (Regs. 218)

207. We recommend use of the sign at figure 142 modified to show the words 'Stop. Weight check'.

Flashing beacons

208. Regulation 24 prescribes a flashing red light to give warning of need for special care and the colours of the structure upon which it shall be supported. A draft amendment to the Protocol states that an intermittent red light shall mean that road users may not pass, and we therefore recommend that these beacons shall show a flashing amber light instead of red: also that the supporting structures of the flashing light should in future all be painted with red and white sloping bands, thus excluding the variant of black and white at present permitted.

Present Regulations do not specify who should be permitted to use a temporary flashing beacon though in fact they are most often used by the police. We recommend that their use be permitted by the police, highway authorities, motoring organisations, the Road Research Laboratory and road work contractors with the consent of the appropriate highway authority.

E. Miscellaneous Signs

(a) Bollards

209. Although not themselves traffic signs bollards usually incorporate signs (most frequently *Keep left*) and they play an important role in the control and safety of traffic. We have, therefore, thought it proper to consider them.

210. Present designs of bollards in the United Kingdom are based on British Standard No. 873: 1959 which includes requirements as regard height, width, colour, illumination and reflectorisation. In the main, bollards are of two types: one has a box-shaped head with a tapering cruciform stem and the other is basically a straight-sided box. When used on roundabouts or on islands in high speed roads, bollards often have a considerably larger head which is wider than the stem. Most bollards are internally illuminated. The European Protocol stipulates no requirements for bollards. They are less widely used abroad and vary greatly in their structure. Such signs as they carry are invariably expressed in symbols rather than words.

The design standard of many existing bollards is very poor, particularly those with cruciform or small diameter circular stems both of which designs fail on the grounds of inadequate conspicuity and poor appearance. We understand that the British Standard is being amended and we suggest that the Institution be asked to give more attention to performance standards and that local authorities ensure that bollards they purchase conform to the amended standard.

211. Protocol practice, which we recommend, calls for bollards to incorporate a white arrow or arrows on a blue ground (figures 14 and 97). Bollards will have to be redesigned and we suggest that a well qualified designer be appointed to do this. He should take into account the following factors:—

(i) *Height*

The bollard should not be so high that small children are obscured or the line of sight of drivers of low-seated cars blocked.

(ii) *Conspicuousness*

We consider that the conspicuousness of bollards needs improvement by night and day. The illumination at night should be greater than at present, particularly in well-lighted streets. The relative aesthetic and functional advantages of amber and white lighting for the base of the bollard should be considered.

(iii) *Resistance to impact by vehicles*

This we consider should not depart greatly from that of the present box-type bollard.

(iv) *Maintenance*

The design should include a standard base fixing so that all bollards are interchangeable and a link should be incorporated in the design so that the electric supply would be disconnected in the event of collision.

We would expect that extensive field trials would be carried out by night and day in a variety of traffic conditions to ensure that the final design is functionally as well as aesthetically satisfactory.

When the design is agreed we consider that the bollard should become a prescribed traffic sign. We think that there should be a high degree of uniformity of bollards throughout the country—this does not mean that an agreed design should remain unalterable for ever—but we recognise that there may be, in some cities, street refuge posts of unusual character which, because of their architectural merit or historic interest, should be retained if adaptable.

212. Where, on roundabouts or islands in high speed roads, there is a need for traffic signs too large to be incorporated in the head of a normal bollard, we recommend that a large internally illuminated mandatory arrow sign be used and the bollard dispensed with.

(b) *Refuge indicator lamps*

213. These are the high-mounted globes placed between bollards on street refuges in order to make the refuge more conspicuous to drivers. They serve a useful purpose and should be retained. We recommend, however, that:—

- (i) with the exception of those at pedestrian zebra crossings, their posts should be of the same colour as that used for the local street lighting columns;
- (ii) at pedestrian zebra crossings they should continue to be painted with black and white stripes to give added emphasis to the crossing; and
- (iii) the lamps should be sufficiently well illuminated to make them clearly visible at night, but not so brightly lit as to cause distraction to drivers or become a substitute for street lighting lamps.

(c) *Traffic cones*

214. Traffic cones are an important means of deflecting vehicles away from road obstructions. There are various types at present in use and we recommend that in future a uniform standard be prescribed in Regulations. Experiments should be carried out to find the best design, but we suggest that they be not less than 18 inches in height, and should be red with a 10 inch white reflectorised band. They should be stable so as not to move in wind or airstream caused by passing traffic, and hollow to facilitate stacking. We have also referred to them in our section on temporary signs (paragraph 194 (v)).

(d) Bus stop signs

215. Endeavours by Departments in the past to prescribe a uniform bus stop sign have, we understand, broken down owing to lack of agreement amongst the bus interests. We believe that a uniform design for bus stop signs and their mounting (adaptable by individual bus companies) is still a practical necessity in the interests of amenity, recognition by bus users, and distinction from other signs. We therefore recommend that a well designed uniform bus stop sign be prescribed in Regulations.

(e) Street name plates and numbering of premises

216. Although street name plates and house numbers are not traffic signs, we have thought it proper, as have previous Traffic Signs Committees, to consider them.

We have seen the Circular to local authorities recently issued on this subject by the Departments and we very much agree with its statement that a higher standard is necessary in street name plates and house numbers to assist people in finding their way especially in emergencies. We endorse its main recommendations namely that street name plates should be mounted as low as practicable, on both sides of the street, at intervals of not more than 200 yards, unobstructed by trees or other growth, and if possible under the illumination of street lamps; that houses should be numbered so that when travelling from the centre of the town a driver finds the odd numbers on the left hand side and the even numbers on the right; that succeeding numbers should be approximately opposite one another even though this requires the omission of certain numbers when frontages vary; and that all house numbers should be conspicuously shown on their gates, if any, otherwise on their doors.

(f) Signs indicating services in by-passed towns and villages

217. With the construction of new by-passes those who have commercial interests in the places by-passed have tended to feel that they will lose business from travellers and in some cases they have pressed for traffic signs to be put up near the junctions of the town roads and the by-pass to indicate that services and facilities are available. In our view this requirement is more properly dealt with by advertisements off the highway than by traffic signs on it and we recommend that traffic signs should not be used for this purpose. Because of the increasing number of places being by-passed we would have thought it reasonable to assume that travellers would often know, or be able to judge from their maps, whether services are likely to be available in these places. But in so far as advertisements are necessary or desirable it may be preferable for them to take the form of a single, composite sign rather than a number of individual signs. This is primarily a matter for local planning authorities.

F. Authorised Signs

218. The present practice is that signs which are required for general use are prescribed in Regulations but that (a) pending the necessary amendment of Regulations, (b) in order to legalise a variation of a prescribed sign not already permitted by Regulation, or (c) when a sign is required only locally or occasionally, it is authorised by the Minister for use at a specified site.

219. We see no need for any change in the present policy and system of authorising but we recommend that in future authorised signs should follow the recommendations which we have made as regards shape, colour and design for each class of sign, and that they should be of the appropriate size for the category of road on which they will be erected (see Appendix VI). They should also be as little wordy as possible and, where practicable, should be expressed in symbols so long as these are immediately and obviously recognisable. It would not be reasonable that the expense of publicity should be incurred to make known the meaning of a symbol unless it is, or is likely to become, of very general use.

220. The lighting, mounting and siting of authorised signs should be subject to the same general standards as we have recommended for other roadside signs.

G. Carriageway Markings

221. With the growth of road traffic the need for carriageway markings is becoming more urgent and with the improvement of road surfaces the scope for their effective use is increasing. The Traffic Signs Committees of 1933 and 1944 each recommended a wider use of these markings than had hitherto been the case. In 1957 the United Kingdom signed the European Agreement on Road Markings which aims at international uniformity in this field.

(a) Types of marking

222. Carriageway markings fall broadly into three groups—transverse, longitudinal and other (mainly worded) markings. We consider each of these in turn and then deal with more general matters.

(b) Transverse markings

223. Half the fatal or serious accidents on our roads take place at or near road junctions. We believe that an effective step which could be taken to reduce these casualties would be to ensure that at the great majority of junctions, and certainly at those junctions where serious danger exists, the minor road is distinguished from the major so that drivers on the minor road are given a clear indication that they should give way to major road traffic.

Broken white lines

224. We are particularly concerned here with those junctions which are not controlled by traffic signals or the police.

In our view a great deal more could be done by the use of carriageway markings to increase safety at junctions not controlled by traffic signals or police and to remove doubt from the minds of drivers and consequently to make such junctions safer. The single broken white line prescribed in Regulations (*Regs. RM6*) to indicate the edge of a carriageway has been widely used by some authorities to indicate which is the minor road. Investigations made by the Road Research Laboratory have shown that these markings have led to a significant reduction in accidents and we have considered whether they should universally be used in this way as a 'give way' warning. We have come to the conclusion, however, that a more emphatic marking is required and we

recommend the use of a transverse double broken white line half way across the mouth of the minor road and a longitudinal white warning line down its centre. Where the minor road carries one-way traffic, the double transverse line should be placed wholly across its mouth and the longitudinal line should join it in the centre. The purpose of the longitudinal line is to give drivers warning, before they see the transverse line, that they are approaching a major road. In narrow roads it could, however, cause confusion and it should not therefore be provided where the carriageway is less than 18 feet in width.

This new transverse marking (and its associated longitudinal marking where appropriate) should invariably be used where there is a roadside *Give way* sign (figure 8) (see paragraph 53) and we advocate its widest practicable use at other junctions which are not controlled by traffic signals or the police, or by *Stop* signs (figure 7) (see paragraph 52).

We have considered what legal significance should be given to the marking. To prescribe it in Regulations as having the mandatory meaning of 'give way' would throw an intolerable burden of enforcement upon the police and a Regulation which is not enforceable tends to bring the law into disrepute. We recommend therefore that the carriageway marking should be prescribed as a warning sign and that drivers should be enjoined in the Highway Code to heed the warning. Its meaning could be explained in the Code to be 'proceed so as not to cause inconvenience or danger to traffic on the major road'. Although not mandatory this marking would in fact have legal significance since non-observance of the warning would doubtless be taken into consideration by the courts when apportioning blame for an accident at the junction.

Continuous white lines

225. In no case should transverse continuous white lines be used simply as a warning of the approach to a major road, as is now sometimes done without authority. Continuous transverse white lines should be reserved solely to indicate where a driver should stop when required to do so by traffic signals or *Stop* signs or where there is police control. Where, because of a gradient, there is a tendency for the stop line to appear foreshortened, and on high speed roads, a much wider line should be used than is at present.

(c) Longitudinal markings

The double white line system

226. This system, which is now widely used on important roads in this country on curves both horizontal and vertical and which conforms closely with carriageway markings used on the Continent, is composed of continuous and broken lines and arrows (*Regs. RM 21 and RM 22*) combined in such a way as to indicate where a driver may or may not cross them. We believe these markings used with discretion to be a valuable aid to safety and recommend no change in the form which they take.

We consider that there should be greater use of offset double white lines on long three-lane hills with the object of reserving two lanes to ascending traffic so that fast moving vehicles can safely pass the slow. The double line should consist of a continuous and a broken line with the broken line on the side of the single lane thus enabling a driver descending the hill to overtake a slower vehicle provided that he can see that it is safe to do so.

Double white lines should not, however, be used to prevent overtaking on the approach to roundabouts, pedestrian crossings or road junctions.

Suggestions have been made that double white lines should be laid so as to allocate the centre lane of *straight and level* three-lane roads alternately to opposite streams of traffic. Our *prima facie* view is that the use of double white lines in these circumstances would jeopardise their observance elsewhere, but we appreciate that, with rapidly growing traffic, Departments may wish to try out every possible means of increasing safety on straight three-lane roads, including the use of offset double white lines on alternate lengths. The use of offset double white lines in such a way as to permit alternate overtaking by opposing traffic streams on *winding* three-lane roads might reasonably be permitted if the experiments now being undertaken clearly demonstrate it to be both safe and advantageous.

Hazard warning markings

227. The markings prescribed (*Regs. RM 3 and RM 20*) are intended to warn drivers on the approach to a hazard such as a road junction or a bend not to cross the line unless they can see that it is safe to do so. We have some doubts about the effectiveness of the present form of this marking and think that a more emphatic broken line would be better and we recommend that trials be carried out to determine how best this additional emphasis should be given.

Warning lines on the approaches to junctions and other hazards should more frequently be extended beyond the minimum length at present recommended.

Lane lines

228. We consider the markings now prescribed (*Regs. RM 19*) to be generally satisfactory though we think that on fast all-purpose roads these markings should be more emphatic and approximate more nearly to those in use on motorways.

Edge of carriageway marking

229. The new transverse broken line marking which we have recommended will serve to mark the edge of the main carriageway at those places where it is used on side roads.

The single broken line marking (*Regs. RM 6*) will continue to be required, however, to serve its prescribed function of marking the edge of the carriageway where this is in doubt, for example, at lay-bys. It could also be usefully employed, for example, where a minor road joins a major one at a widely splayed Y junction. Under such conditions the left half of the mouth of the minor road would be marked with the recommended new marking and the remainder with the single broken line, thus forming a continuous guide line to help drivers on the major road by night, and particularly in fog, to follow the course of the road. Here again we feel that a more emphatic form of edge of carriageway marking is needed on high speed roads.

Continuous yellow line

230. The marking prescribed at *Regs. RM 24* is for use in connection with a restriction on loading and unloading. We have referred to it in paragraph 87 (ii) as part of our recommendations on waiting restriction signs.

(d) **Other markings**

Slow (Regs. RM 7)

231. We recommend the continued use of the word 'Slow' on the carriageway to supplement roadside warning signs and advance direction signs as appropriate.

Give way

232. We recommend that Regulations permit the *Give way* roadside sign (figure 8) to be supplemented by a carriageway marking where in the view of the highway authority such an advance warning is desirable. This could take the form of a hollow white inverted triangle or the words 'Give way' whichever is found by experiment to be the more effective.

Stop

233. The word 'Stop' should always be used on the carriageway to supplement the sign recommended at figure 7. The word 'Halt' (*Regs. RM 30*) should cease to be used.

Bus stop (Regs. RM 8)

Taxi rank (Regs. RM 9)

Look right/left (Regs. RM 16)

234. We recommend that these should continue to be used in their present form.

Destination markings and direction arrows (Regs. RM 17 and RM 25 to 29)

235. There should be greater use of direction arrows marked on the carriageway, and also of place names indicating advance destinations, and they should be set well back within lane lines so that drivers are assisted to move into the correct lane in good time before reaching a junction.

Keep clear

236. The words 'Keep clear' are now used with some success on the carriageway opposite junctions which tend to be blocked by traffic held up by a railway level crossing or at a junction ahead. We recommend the continued use of the words for this purpose.

Other worded markings

237. With the increase in traffic and liability to urban congestion there is some justification for keeping spaces in front of ambulance stations, hospitals and fire stations clear of parked vehicles so that ambulances and fire appliances can move in and out; also in front of schools so that children can be clearly seen from passing vehicles. A few markings such as '*Ambulances only*' and '*School entrance*' have been authorised and have proved effective. We think they should continue to be authorised where serious difficulties would be created without them but they should not be allowed to proliferate nor be permitted for the benefit of private interests.

(e) Colour of markings

238. We are aware that in the European Agreement on Road Markings the principle is stated that road markings may be either white or yellow, but that whatever colour is adopted for central markings, the other should be used for marking the edge of carriageways. Since in this country we use, and should in our view continue to use, white for central road markings, and since yellow is, we hope, to be reserved to indicate waiting restrictions, we recommend that the edge of carriageway markings be also in white rather than yellow as is in fact already predominantly the case. Use of a broken yellow line to divide a clearway from its lay-hys, as is at present the practice, should be discontinued. Lay-hys on clearways, as on other roads, should be divided from the main carriageway by the broken white line to which we have referred in paragraph 229 above.

239. We believe that new methods of producing coloured carriageway markings should continue to be closely investigated. The use of coloured road surfaces is being developed abroad to indicate traffic lanes or the approach to junctions. This should also be carefully looked into bearing in mind particularly the need to reduce accidents at junctions.

(f) Surface texture of markings and the use of steel studs and plates

240. All carriageway markings should have a skid-resistant surface.

The use of stainless steel plates as carriageway markings should be discontinued because of their tendency to cause skidding. They should be replaced by white lines.

Our remarks about steel studs at pedestrian crossings (paragraph 253) apply equally to those used for other purposes, such as to mark taxi ranks and parking bays.

(g) Higher standards of road marking

241. There are still many miles of road without lane lines and warning lines. With the increase in traffic volume these markings are becoming very much more necessary and in our view they should be more extensively used in rural areas where the roads have a width of over 18 feet. They should also be used in urban areas except where the width of a street is inadequate and also where, as in residential districts, roads are used by purely local traffic.

242. In our view the most effective type of reflector is the 'catseye' reflecting road stud. This has been employed very successfully for many years. There is also scope for greater use of the white line reflectorised with glass beads (ballotini). This is much more visible by night than the unreflectorised line except when covered with water. Although detailed guidance is given by the Departments on the use of various road markings, it is left at present to the discretion of highway authorities to decide when reflectorised or unreflectorised white lines should be used and also where to employ 'catseyes'.

We are aware that 'catseyes' are much more generally used in this country than in many countries abroad. Nevertheless we think that in view of the increasing need for safety measures and guidance at night, reflectorised white

lines should also be used when the volume of traffic is heavy or where fog is prevalent. What the precise standards of marking should be is a matter which we recommend for consideration by the Departments in consultation with local highway authorities.

Double white lines are the most important longitudinal marking because they are mandatory and we consider that they should always be laid in reflectorised materials with 'catseyes' between them.

The appropriate form of marking for lane and warning lines will depend both on the volume of traffic on the road and whether or not it is lighted throughout the night. We suggest that where there is no street lighting or it is switched off during part of the night the use of both 'catseyes' and reflectorised lines should be considered for both lane and warning lines on the most heavily trafficked roads and roads where there is a high incidence of fog, poor alignment or dangerous conditions (e.g. on mountain roads). On lightly trafficked roads and roads not subject to fog, the choice between plain lines and reflectorised lines, either alone or in combination with 'catseyes', will mainly need to depend on traffic conditions on these roads but we think that plain lines might generally be sufficient where 'catseyes' are employed. In streets where the lighting is in operation all night we doubt whether 'catseyes' are necessary except possibly in foggy areas. Normally plain lines alone would be appropriate.

243. Under present Regulations 'catseyes' are reserved for longitudinal markings. We think that this should continue to be the case and that they should not be used in stop lines.

It is current practice to use white reflectors in 'catseyes' set in the central part of the carriageway and occasionally red reflectors at the edge of the carriageway. Because of the risk of confusion with central markings in fog we do not advocate the use of white 'catseyes' to mark the edge of the carriageway at Y junctions, acceleration or deceleration lanes or at lay-bys. In these circumstances the broken white lines mentioned in paragraph 229 should be used and these should be reflectorised wherever special emphasis is required by road or traffic conditions.

We do not consider that yellow or other coloured reflectors alone (excluding red which is used for edge marking) are sufficiently distinctive to be used in central markings to indicate, for example, the approach to a road junction. Experimental work done by the Road Research Laboratory in the use of alternate white and yellow 'catseyes' set in warning lines shows promise and we think that this should be studied further. If this method of marking proves satisfactory it might then be used not only in the centre of the road to indicate the approach to a hazard but also along the edge of the carriageway at lay-bys and side roads.

(h) Maintenance

244. The standard of maintenance should be raised and restoration of all road markings after road repairs should take place sooner so that the long intervals often experienced between road repair and replacement of lines and 'catseyes' do not occur. Where work is done by contract the Departments might consider whether or not it would help to reduce these delays if the restoration of carriageway markings with completion of road works was made obligatory by the terms of the contract.

H. Traffic Signals

245. Two types of traffic light signals are at present prescribed in Regulations. They are the red, amber and green signals (or red and green only) used primarily to control traffic at road junctions and road works and the twin horizontally-mounted red flashing lights used mainly at railway level crossings.

The red, amber and green signals used in this country are to a greater degree vehicle actuated (as distinct from fixed time) than is the case elsewhere in the world. We warmly approve the policy of using vehicle actuated signals, for it means that their operation can be made as sensitive as possible to variations of vehicle flow. This minimises delay and reduces accident risks by arranging that signal changes occur whenever possible during gaps in traffic flow. We recommend that the replacement of fixed time by vehicle actuated signals should continue until no fixed time installations remain. Changes in vehicle flow on all-purpose roads will call for continual adjustments to the timing of lights and we strongly advocate the use by local authorities of specialist staff for the servicing, adjustment and maintenance of their traffic signals. This should include routine checking of the optical equipment to ensure that intensities do not fall below the required standard, as is too often the case today.

246. We think that the main direction in which improvement of traffic signals can be obtained is in the wider use of selective control of complicated junctions by green arrows. Left and right pointing green arrows are already prescribed in Regulations but we recommend that further latitude be given by permission to use arrows pointing in any direction above the horizontal. There are, however, limits to the replacement of a full green signal by green arrows. For instance, where there are more than four arms to a junction it would not be physically possible to use only green arrows unless a double arrow were used on a single lens—which we do not advocate owing to its lack of clarity. A single filter arrow followed by a full green signal would be preferable. As a general rule therefore the full green signal should be used to indicate that movement in all directions is possible; this indication should not be attempted by arrows alone. Where a green filter arrow is in operation so that, for example, traffic may turn to the left while the forward stream is still held by a red light, a greater use should be made of advance signs (figure 133) and carriageway markings (see paragraph 235) to help drivers to move early enough into the appropriate lane. There is otherwise a risk that the advantage of the filter lane is lost because it becomes blocked by a driver not intending to go in that direction.

247. Where there is a heavy right-turn movement, this traffic is sometimes helped by giving a red signal to traffic approaching on the other side of the junction before the signal on the side with the heavy right-turn movement is changed from green to red (a device known as 'early cut-off period'). Where this facility is provided a right-pointing green arrow is displayed in addition to the green signal during the latter portion of the green signal while traffic in the opposite direction is stopped. We endorse the action of the Departments in recommending general use of this arrangement where early cut-off periods are provided.

248. Where signals have to be installed on high-speed roads there is a need for them to be more conspicuous and visible from a greater distance than would

be possible with the normal installation at the roadside. This is particularly so on 3-lane dual-carriageways where drivers on the centre lane may have their view of the signal obscured by vehicles in the other lanes. It is also necessary on wide and heavily trafficked roads in urban areas. In both these circumstances we think that overhead traffic signals, as already used abroad, may be necessary. If so, these should be suspended where possible from existing structures or the walls of buildings. But where special gantries are unavoidable they should be designed with due regard to amenity.

Overhead signals could also be used to control tidal flows by lane switching, a green vertical arrow indicating that movement is permitted and a red cross that it is not. Experience abroad suggests that these lane control signals should be repeated at intervals of not more than 300 yards and that they should not be placed where they can be confused with signals controlling intersections.

249. There is a serious danger that traffic signals in urban areas may fail to be seen because they become confused with the background lights of shops and advertisements. Powers already exist to prevent such lights being placed where they conflict seriously with the efficiency of traffic signals. We recommend that highway authorities make a more constant review of distracting lights placed in the line of traffic signals and take such steps as are possible to have them removed. Some amelioration can, however, be achieved by the use of backing boards for traffic lights. The claims of both black and yellow have been advanced for these boards but we think black makes the more effective contrast for light signals. The backing board can be made more conspicuous by providing a white or coloured border.

We believe that the visibility of traffic signals would be further enhanced by contrast if the signal heads were painted entirely black, instead of being banded black and white as they are at present. As it is important that traffic signal installations should be conspicuous both to drivers and pedestrians we consider that the present practice of having black and white bands on the supporting posts should be continued. If, as we advocate, further consideration is given to improving the general design of light signals the addition of backing boards should be taken into account as part of the design problem.

250. We regard the twin red flashing light signal as being satisfactory for the purposes for which it is used and recommend no change.

251. It remains to consider the problems of how best to help pedestrians at traffic signals. This help will normally be at the expense of vehicle flow, as is the case with the all-red phase when introduced for pedestrian benefit at junctions, and a decision on whether to introduce it will depend upon the number of pedestrians to be catered for and the vehicle flow. Combined vehicle and pedestrian phases are sometimes possible where the only permitted movements during the vehicle phase do not pass over the pedestrian crossing. We think that the decision to provide such arrangements must be a matter for the experienced judgment of the Departments and that no rule of thumb can be formulated. Nevertheless we feel that the growth of traffic in urban areas makes it necessary to give pedestrians more help in crossing the road safely.

When a pedestrian phase is provided indications are given to pedestrians by special signals advising them to cross or wait. This phase is usually called by

push-button. An alternative arrangement recently introduced at some junctions where pedestrian volume and vehicles flows do not justify or permit a pedestrian phase is to provide that at the beginning of a vehicle phase only straight-ahead traffic is released. This is done by a vertical green arrow so that during this period turning traffic is prevented and pedestrians can use the parallel crossing safely. We recommend that there should be more of these helpful arrangements for pedestrians.

At most crossings, however, pedestrians are at present expected to judge for themselves when it is safe to cross by keeping their eye on the traffic. At the simpler junctions pedestrians are usually able to see at least one signal appropriate to each traffic phase to help them in judging the traffic situation. But where complex methods of control are employed, signals can be confusing or misleading and it is safer to judge mainly by watching the traffic. We consider the situation should continue to be governed by the general injunction that pedestrians should watch the traffic and that turning traffic should give way to pedestrians who are crossing.

We have noted the wide variation which at present exists between different countries in the signals given to pedestrians and in the rights and duties of both pedestrians and drivers in respect of such signals. For example, in this country pedestrian signals are given for guidance and are not mandatory. In some countries, however, it is an offence not to obey their indications. 'Cross' signals or their equivalent mean here that all vehicular traffic over the crossing is stopped. But abroad the pedestrian is sometimes protected from traffic only by virtue of the general requirement that it should give precedence to pedestrians. The actual signals given, even for the same circumstances, vary considerably. This is a problem which is at present under international review. We hope it will be possible to achieve a greater measure of international standardization of signals and their meanings. Whatever signals are eventually adopted internationally, however, we think the equivalent of the 'Cross' signal should continue to be given by a white, rather than a green, signal since there is risk that a green signal could be seen by drivers and mistakenly interpreted to refer to them. We also think that whenever this signal appears pedestrians should be protected from vehicular traffic. We have used the word 'Cross' in this paragraph but we recommend that in future its meaning should be conveyed by a symbol.

Where a turning movement is permitted by filter arrow it may be an advantage to provide guard rails in order to prevent pedestrians crossing at the mouth of the road. Where this is not practicable and a special pedestrian phase is not provided, pedestrians can be assisted if the stop line and the signals are moved 20-30 feet back from the pedestrian crossing so that they have this distance in which to see the movement of traffic about to turn. We would like to see more use made of this arrangement in the interests of pedestrians.

At certain types of junctions where there is two-phase control, such as T junctions, staggered crossroads and junctions with one-way streets, we think that additional signals should more frequently be installed to ensure that pedestrians can see not only the signals controlling the traffic stream they are about to cross but also those for traffic flowing at right angles.

Where one-way systems have been introduced signal-heads facing the direction in which traffic no longer flows should be retained and their lenses masked to show only a cross so that pedestrians are warned before traffic starts to move again.

I. Pedestrian Crossings

The present position

252. Pedestrian crossings fall into two groups:—

- (i) those controlled either by the police or by signals, and
- (ii) uncontrolled crossings, commonly called 'zebra' crossings.

The limits of all crossings are marked by parallel lines of studs which may be either square or circular and of any material which is white, silver or light grey in colour. In addition, zebra crossings are marked with black and white stripes and have a double row of studs on the approach side to show the limit of the area within which Regulations forbid vehicles to stop. Zebra crossings also have flashing amber globes on each side of the carriageway. These are mounted on posts painted with black and white bands.

Stud markings

253. The studs used in the carriageway to mark the limits of pedestrian crossings and of the approaches to them are commonly made of metal, which tends to become smooth with wear. The Cyclist Associations complain that these studs are dangerous because they can cause cyclists to skid; motor cyclists also object to their use. They can cause pedestrians to slip, especially in wet weather.

We have been unable to ascertain with any accuracy the number of accidents which have been caused by these studs but we think that the danger is slight.

If, however, a sufficiently durable material can be found which is easily visible and non-skid and can be set in the road surface we recommend that it be used in preference to metal studs.

Zebra markings

254. A considerable amount of research preceded the choice of the black and white stripes now used for the marking of zebra crossings. Various other forms of marking were tried but none was found to be as conspicuous to drivers and pedestrians alike as the longitudinal stripes, particularly when they are formed from materials of different surface textures. We regard these markings as satisfactory and do not recommend that any change be made in them.

Beacons

255. We recommend no change in the amber flashing beacons at zebra crossings.

256. Contrary to our recommendations elsewhere that other roadside traffic sign posts (except those for signals) have their black and white banding removed in the interest of amenity, we think the beacon posts should continue to be banded for the sake of emphasis and in the interest of pedestrian safety.

Other Considerations

A. Illumination

257. Traffic signs should be as effective after dark as in daylight. This can only be achieved by adequate illumination or efficient reflectorisation.

258. The 1957 Traffic Signs Regulations give highway authorities wide discretion regarding the illumination and reflectorisation of traffic signs. Apart from a few exceptions it is permissible, but not obligatory, for any sign in the First Schedule to be either illuminated or reflectorised. The exceptions include *Halt* and *Slow* signs (which must be either externally lighted or reflectorised) and *Turn left* and *No right turn* signs, and their counterparts, attached to traffic signals (which must be internally illuminated at all times). Where any warning, mandatory or prohibitory sign is illuminated (except by internal lighting) the surmounting symbol is required to be either externally illuminated (by the same means as the sign if it is so lighted) or reflectorised. Illumination of legends by reflecting lenses or reflective sheetings is permissible for any sign in the First Schedule provided its letters are 3 inches or more in height. No specific requirements are prescribed for the illumination of directional signs. As a result many in urban areas rely for their illumination on street lighting, which is often quite inadequate. In rural areas they are often not illuminated or reflectorised at all.

The Traffic Signs (Speed Limits) Regulations and General Directions 1962 require terminal speed limit and derestriction signs on a trunk or classified road, when erected within 150 yards of a street lamp, to be externally illuminated. But exceptions to this requirement are admitted where the signs are illuminated by street lighting or are fitted with reflectors or reflecting material. Where the signs are located on an unclassified road or more than 150 yards from a street lamp on a trunk or classified road, they must be either illuminated by external lighting or reflectorised. But again these requirements are not enforced if the Minister is satisfied that the signs are illuminated adequately by street lighting. In practice many terminal speed limit signs are lit only by street lamps.

259. In our opinion the present statutory requirements for the lighting of traffic signs are too lax; they do not require any illumination or reflectorisation to be provided for certain important signs such as directional signs, and they permit quite inadequate illumination of others. We recommend that the Regulations be amended to require a considerably higher standard. In particular all warning, mandatory and prohibitory signs, other than waiting restriction signs but including all speed limit signs (other than repeaters) and all advance direction signs should be illuminated by direct lighting wherever there is a system of street lighting. In places where street lighting is switched off or reduced for part of the night the lighting of these signs should be maintained throughout the hours of darkness. Where there is no street lighting it should be permissible for these signs either to have direct lighting or to be reflectorised. The symbolic *Turn left* and *No right turn* signs which we have recommended for attachment to traffic signals should be internally illuminated at all times wherever they are, as are the present signs.

At all important junctions on Primary routes there should be direct lighting of directional, mandatory and prohibitory signs. We appreciate that at present

an electricity supply may not be readily available at all of these junctions, particularly those in rural areas, but we think that as soon as possible electricity should be provided for them.

It should be left to the discretion of highway authorities to decide whether directional signs as well as other important signs be externally or internally illuminated. We are aware of recent developments in the design of box type internally illuminated signs for commercial purposes and we think that there is a use for this type in the traffic sign field.

As many informatory signs in lighted urban areas do not justify the expense of direct lighting (e.g. toilet and parking signs), these should be placed where they are made visible after dark by street lighting.

As regards temporary signs, all mandatory, prohibitory and warning signs, and most informatory signs, should be reflectorised. But we recognise that where temporary warning and informatory signs are used for a very short period, for instance for local special events, it might involve unreasonable expense to reflectorise them unless they are important to safety. Such unreflectorised signs should be placed so that they catch as much light as possible.

260. Button type reflecting lenses have been commonly used to illuminate the characters and symbols of traffic signs. But these have been largely superseded by beaded reflecting material applied to the sign background so that its characters and symbols are seen in dark contrast against it. In our view, reflecting material is greatly superior to reflecting lenses for this purpose.

Reflecting material should be used for the background illumination of all black on white directional signs other than those which are directly lit. We have made tests to determine whether reflecting material could effectively be confined to panelling the legends and bordering the route symbols of advance direction signs but we have found this to be unsatisfactory. We therefore recommend that whatever the size of a black on white sign the whole background should be reflectorised.

261. British Standard No. 873: 1959 'The Construction of Road Traffic Signs and Internally Illuminated Bollards' specifies the requirements for external lighting lanterns for the direct illumination of traffic signs. It also recommends the number of lamps and their ratings for different sizes of sign. As regards the photometric performance of the lanterns the standard specifies that the light distribution shall be such that when the lantern is mounted with the appropriate sign the average luminance of the white parts of the sign shall be between 4 and 10 candelas per sq. ft. and the maximum luminance shall not exceed 30 candelas per sq. ft. Maximum values of luminance variation are also specified ranging from 10:1 for a 2 x 2 ft. sign to 40:1 for a 6 x 6 ft. sign.

262. It seems to us that the external lighting at present provided is frequently far from adequate. There seem to be three possible reasons for this:—

- (i) the variation in luminance permitted in B.S. 873 is too wide;
- (ii) the lighting lanterns fail to meet the photometric requirements of B.S. 873;
- (iii) the signs and lighting equipment are inadequately maintained.

As regards (i) it has been represented to us that the limits for average luminance in the British Standard should be raised to cater for the illumination requirements of signs in streets lighted to Group A standard or better. It has

also been suggested that the luminance variation ratios allowed in the British Standard are too high and that greater uniformity of brightness should be specified.

Regarding (ii) we are aware that much thought and care has been taken in the design of sign lighting lanterns to meet the requirements of the British Standard, but we are not satisfied that the requirements are always being met, even with newly erected equipment. We appreciate that the problem is not an easy one and that the mounting of the lantern in relation to the sign plays an important part in the final result. We suggest that a much improved light distribution would result from the more widespread use of tubular fluorescent lamps in suitably designed trough reflector lanterns, particularly for the larger signs. Functionally, the best position for the lanterns is below the sign so as to avoid shadows being cast on the sign face in sunlight. But we realise that on all-purpose roads there tends to be a risk of malicious interference where the lanterns are mounted below the sign, and we recommend that where this risk exists the lanterns be placed above the sign.

As regards (iii) we cannot stress too strongly the importance of adequate maintenance of lighting equipment and we refer to this in paragraphs 286 and 287.

In view of the general inadequacy of the present sign lighting arrangements, and signs above the maximum size of 6×6 ft. quoted in the Standard are likely to be more common in the future, we recommend that the Standard be reviewed without further delay, and that emphasis be given to the points mentioned above.

263. Care needs to be taken in the mounting of sign lighting lanterns to ensure that no distracting stray light is shed in directions behind the sign and that the lanterns do not obstruct any part of the sign face. The former is particularly objectionable on unlighted roads where the stray light may mislead drivers approaching from the opposite direction. Careful adjustment of the brackets supporting the lanterns and the provision, where necessary, of suitable screens should overcome these defects. Shadows cast by the lanterns in strong sunlight can also be troublesome. This needs to be borne in mind in the design and mounting of the lantern if this shadowing is to be kept to a minimum.

B. Siting and Mounting

Distance and spacing

264. Roadside signs should be so placed that a driver is able to read their message in sufficient time to take any necessary action safely. The correct distance between the sign and the junction or hazard to which it relates depends on the average speed of traffic on the road and on road conditions. The increased speed of modern vehicles has tended to result in many signs (particularly advance direction signs) erected some years ago now being too near the junction or hazard to which they relate. When existing signs are replaced by new types it is important that they should be sited at correct distances from the junction and these are indicated in Appendix VII.

265. Lane indication signs (figure 133) on the approaches to signal controlled junctions should be sufficiently far back to enable all drivers to take the correct

lane. The right distance from the junction will depend on the length of the traffic queues which normally form at the signals.

266. Where it is necessary (see paragraph 90) to supplement a *Roundabout* sign (figure 36) with a plate reading *Reduce speed now* (figure 36a) the sign should be placed on the central reservation at a point about 500 yards from the roundabout and repeated on the nearside verge at a distance of about 440 yards from the roundabout.

267. Intermediate waiting restriction and clearway signs should be provided near to and on both sides of any junctions along a restricted road and clearway so as to be readily seen by drivers entering it from the side road. Where the signs are supplemented by carriageway markings and provided there are no junctions, the permissible spacing between adjacent signs should be 300 feet for normal waiting restriction signs, and 400 feet for signs on peak-hour clearways. Where no carriageway markings are used with waiting restriction signs the present permissible spacing of 200 feet should be retained. Signs on clearways (other than those which apply only during peak hours) should have permitted intervals of a mile.

Height

268. The height at which signs are mounted is also important. Broadly, signs should be set at the eye-level of a driver in an average private car and we recommend that the lower edge of the sign should be 3 to 5 feet above the highest point of the carriageway. In urban areas signs liable either to be obscured by pedestrians or to obstruct them will have to be set above their heads and in this case we recommend a clearance of 6 feet 9 inches above ground level. But it will often be possible to place signs, particularly flag type direction signs, at the edge of the footpath, for instance on guard rails as is widely done abroad. Here they will not normally be obscured by pedestrians and, in the light of local circumstances and the volume of traffic, some risk of obscuration by vehicles should be accepted. These low-mounted direction signs can if necessary be supplemented by signs at a higher level. An advantage of the higher signs is that they can be given independent direct illumination whereas signs on guard rails cannot because of the risk of damage to the lamps.

Position in relation to the carriageway

269. Apart from those mounted above the road, signs should normally be placed on the nearside of the carriageway though there will be certain obvious exceptions such as the *Keep left* sign and those attached to traffic signals located on central refuges. There may also be exceptions in one-way streets and on dual-carriageways where signs are required on the central reservations.

270. Adequate clearance should be provided between the nearside edge of the sign and the edge of the carriageway. It is impossible to give firm criteria because so much depends on actual site conditions, but in urban areas the clearance should never be less than 1 foot 6 inches. On high speed dual-carriageway roads it should be 4 feet or more.

271. Care should be taken to ensure that signs are not so sited as to be obscured by existing structures nor liable to be overgrown by trees, hedges or

herbage. If this risk cannot be avoided by siting, the growth must be regularly cut and we refer to this in paragraph 289. Where the target value of a sign is impaired by the background against which it is viewed, it should be provided with a surround which effectively draws attention to it.

272. Reflectorised signs should be so mounted in relation to the carriageway that they can be seen easily in dipped headlights. For, with the increasing volume of vehicles on our roads it will become more and more necessary for drivers to travel with their headlights dipped after dark so as not to endanger oncoming traffic. This also makes it more important for signs at junctions on unlit roads to have independent illumination. We have recommended this at major junctions on Primary routes but it may also be desirable at major junctions elsewhere.

Alignment

273. All signs which are placed so as to face along, rather than across the carriageway should be turned 5° away from oncoming traffic on straight roads, with suitable adjustments on left hand bends. This will prevent the legends on signs being made less legible by specular reflection from headlights. In the case of advance direction signs this is particularly important. We have recommended elsewhere that waiting restriction signs should be set at right angles to the carriageway so as to be more visible to traffic approaching from either direction. They should be mounted on top of their posts, but any supplementary plates should be set parallel to the carriageway and thus at right angles to the signs.

274. *No entry* signs (figure 15) should be aligned so as to face drivers who might attempt to enter the street to which the signs refer.

Method of mounting

275. As far as possible smaller signs, particularly waiting restriction signs, should be fixed to existing posts or walls, in order to avoid adding to obstacles on the pavement. But care should be taken to see that the background is such as to make the signs conspicuous. We do not think that wall-mounting is satisfactory where the footpath is more than 6 feet wide. Where posts need to be provided for smaller signs they should continue to be round so that the positioning of the signs is easily adjustable after the posts are in position. Posts should if possible have the same diameter throughout their visible length, but if enlargement is necessary to contain equipment it should be at the base. The supporting post should not show above the sign. Where possible signs should be mounted together rather than on separate posts.

276. Where a sign has a plate below it there should be a sufficient distance between the sign and the plate to ensure that the outline of the sign is not impaired (see Appendix VIII).

Overhead mounting

277. In densely trafficked urban areas where roadside signs and markings on the carriageway are liable to be hidden from the view of drivers by other vehicles, it may be necessary for direction signs to be mounted overhead. This

form of mounting is particularly useful for signs indicating the correct lane to be taken at the approach to a junction. Wherever possible use should be made of existing structures, otherwise suitably designed gantries should be provided.

Duplication of signs

278. The current practice of providing *No entry* signs on both sides of the carriageway should be continued. Similarly, the permanently illuminated *No right/left turn* signs attached to primary traffic signals should be duplicated on the signals, if any, on central refuges.

279. We have considered whether there is a case for placing advance direction signs on the central reservation of all high speed dual-carriageway roads as well as on the near side. It has been put to us that this should be the normal practice since the view of signs mounted on the verge tends to be obstructed by large vehicles travelling in the nearside lane. We recommend that advance direction signs be placed on the central reservation (provided it is wide enough) of all high speed dual-carriageway roads as well as on the near side.

Position of directional signs in relation to junctions

280. In Appendix V we refer to four classes of all-purpose roads, one being roads built to near-motorway standards. Since the design characteristics of the latter are similar to those of motorways, their sign requirements are also similar. On the approaches to grade-separated junctions on these roads there should be two map type advance direction signs as compared with the three on motorways. One should be half a mile before the junction and the other at the beginning of the deceleration lane. The layout of these two signs should be the same except that on the first the forward destination should be omitted and the distance to the junction included near the bottom of the sign (figure 76). Both signs should be placed behind the hard shoulder. There should also be a supplementary direction sign (figure 94) at the nose of the land separating the main carriageway from the slip road, and a route confirmatory sign (figure 93) on the left hand verge just beyond the junction.

On other roads the distance between the advance direction signs and the junctions to which they refer will depend on average traffic speeds approaching the junction. Correct distances are suggested in Appendix VII, but these of course may have to be modified by local conditions.

Direction signs at roundabouts should be located on the guide islands or, on dual-carriageways, the central reservation. Care should be taken to ensure that the signs do not prevent drivers who are entering the roundabout from seeing traffic coming from the right.

C. Three-dimensional Aspects of Sign Design

Ministers' control

281. We think the design of many existing signs is very poor and recommend that Ministers should exercise much more rigid control over this aspect of traffic signs. A well designed sign is one which has been planned as a unit, is as simple as possible, as durable as necessary and has a good all-round appearance.

Such a sign is normally the work of an experienced designer, and if manufacturers do not employ staff capable of producing signs of good standard they should seek outside professional advice. Alternatively, Ministers could employ a designer to draw up a set of three-dimensional standards which manufacturers could use as models.

Appearance of the backs of signs

282. Bracing is normally needed on all but the smaller signs and cannot be avoided where sheet materials or thin sections are used. We think it better to accept that the bracing will be visible and to ensure that it is unobtrusive, rather than to attempt to conceal it behind a cover. The aim should be to ensure that the sign is as inconspicuous as possible from behind. The back of the sign and the bracing should be neat and coloured grey (paragraph 47).

D. Materials for Sign Construction

283. A good traffic sign, apart from being well designed, should have as long a life as possible and should retain its original appearance throughout. These characteristics can only be achieved by the employment of sound manufacturing methods and best quality materials. Our problem has been to consider whether present standards are adequate or whether new methods and better materials are available and could be employed. The apparent ease with which some of our present signs are bent or removed by hooligans seems to us to indicate either that our standards are inadequate or that insufficient attention is paid to them by sign makers.

British Standard No. 873, to which we have referred elsewhere in this report, specifies the materials, quality and finish of road traffic signs and of the posts and fittings which support them. Minimum standards for construction are also specified and compliance with its standards should be made a condition of the purchase of new signs.

284. Since the war the faces of most roadside signs have been constructed of either cast or sheet aluminium or aluminium alloy. This is reasonable in cost, resists corrosion, is light in weight and, in the case of sheet aluminium, can be readily embossed. This latter is an important feature in the manufacture of signs required in large numbers in which it is common practice to form the message by embossing the symbol, legend and border on the sign plate. For these reasons aluminium will continue to have an undoubted advantage in future sign construction.

Our attention has been drawn to the merits of vitreous enamelled sheet steel in the construction of sign plates. Signs made in this material and dating from before the war are still to be seen but this method of surfacing was largely abandoned after the war, both because sheet steel was scarce and because at that time vitreous enamel had certain defects for sign surfaces. The main defect has been its liability to chipping and the consequent corrosion of the sign plate as can be seen by the number of plates still on our roads which have been damaged this way. However, we understand that by improved methods of manufacture this defect has been largely overcome. Vitreous enamel has the advantage that its colours are permanent. We think that trials of signs in this material should be conducted in order to assess the potentialities of vitreous enamel.

We have also considered the claims of plastics and laminated glass fibre both of which are as yet little used in the construction of traffic signs in this country. Although these materials are less easy to reflectorise than metal they do have the advantages of being light in weight, easily maintained and not subject to corrosion; also, because they can be made translucent, they can be used for the construction of internally illuminated signs. Provided that signs in these materials can meet the requirements of British Standard No. 873, particularly as regards weathering, we think there should be more widespread trials of these materials.

Tubular steel posts are in common use as supports for traffic signs on all-purpose roads in this country. They combine strength with a relatively small cross section and they are easily cut to suit special requirements. These factors, coupled with their ease of handling and erection make them particularly suitable for the mounting of signs in urban areas, especially where space may be restricted.

On motorways concrete posts have been employed with success for the mounting of large advance direction signs, but concrete has hitherto been little used in this country to mount signs on all-purpose roads. On visits abroad we have observed with interest the use of concrete for supporting high-mounted signs and also the single pillar concrete mounting for low signs. We have consulted our sign making industry regarding the economic attractions of this material abroad and the extent to which they would be valid in this country. We see no reason to recommend any widespread change to the use of this material for sign supports in this country.

E. Maintenance

285. However carefully traffic signs are designed and sited much of their value will be lost if they are not well maintained.

The amount of maintenance required depends to a large extent on the materials used, and capital cost frequently has a bearing on the extent of subsequent maintenance. We recommend that the attention of responsible authorities should be drawn to the disadvantages of automatically accepting the lowest tender for the supply of traffic signs and that they should be reminded that higher first costs may well be justified by savings in maintenance costs.

286. The general standard of maintenance of signs and their lighting equipment leaves much to be desired. It is most important that signs should be regularly cleaned and painted. Low mounted direction signs are particularly liable to be obscured by dirt thrown up from the carriageway in wet weather. When more of these signs are low mounted, as we recommend, in order to be seen in dipped headlights, there must be increasing attention to keeping them clean. This may entail more staff and costs unless improved mechanical cleaning equipment can be produced.

287. Traffic signals and sign lighting equipment should both be checked by specialist staff to ensure that intensities do not fall below specifications; they should also be inspected regularly after dark to detect faulty lamps and equipment.

288. When waiting and loading restrictions are to a greater extent indicated by yellow markings at the edge of the carriageway, these markings will need constant inspection and renewal to ensure that they do not become obliterated.

This will be necessary also for the new transverse markings which we have recommended should be used as widely as possible to distinguish minor from major roads at junctions. Indeed the greatly extended use of warning lines, lane markings and 'catseyes' which we have advocated will call for equally improved maintenance services.

289. More attention needs to be given to preventing the obscuration of roadside signs by the foliage of trees and the growth of hedges.

290. It is because these maintenance services are so important that we have recommended in paragraph 300 that in future classification grants be made conditional upon evidence being produced that adequate maintenance services have been regularly carried out.

F. Sign Clutter

291. There is growing public concern about the way in which the appearance of our roads is being spoiled by the ill co-ordination, and sometimes the excessive provision, of signs, notices, advertisements and other street furniture. We think it right to consider to what extent traffic signs are guilty in this respect and what should be done about sign clutter.

The increase in vehicles has perforce been accompanied by more traffic regulations and prohibitory and mandatory signs have multiplied. Clearly it is essential for safety and ease of travel, as well as to secure compliance with the law, that adequate traffic signs should be provided and maintained. But we believe they can be improved in siting, and in some places reduced in number, both in towns and in the country.

Certain local authorities have taken this problem in hand and, sometimes with the help of national and local amenity bodies, have achieved valuable improvements. As experience has shown the tidying up of urban streets can often result in traffic signs becoming more easily visible, especially if care is taken to prevent them being obscured or outshone by advertisements and other distracting notices by night as well as by day. In the interests of public safety we hope that local planning authorities will exercise to the full their powers to ensure that traffic signs are not obscured or impaired by advertisements.

292. Elsewhere (paragraphs 264 to 280) we have made detailed recommendations about the mounting of signs often with the primary aim of reducing street clutter. For instance we have advocated that signs should be mounted together rather than on separate posts, if it can be done effectively, and that they should be put on existing structures such as lamp posts or walls if available, provided their visibility is not impaired. When new signs are erected highway authorities should ensure that they are well arranged and that those superseded are removed. Many of the new signs we have recommended are in themselves better integrated than the old ones because they contain the whole of their message within a simple triangular or circular shape, whereas existing signs have surmounting triangles, discs or circles in addition to the plate containing the legend. We have also made suggestions (paragraphs 85 to 87) for reducing the frequency, variety and complexity of waiting restriction signs.

293. Together these suggestions should make some contribution to the reduction of clutter, but of course the problem goes far wider than traffic signs.

Administration

A. General Considerations and Recommendations

294. The history of the administration of traffic signs has been one of a gradual trend towards centralisation in order to diminish diversity and prevent proliferation. The Motor Car Act of 1903 imposed the first obligation to put up signs and this was placed upon local authorities. But the differences with which the many responsible authorities carried out their obligations, together with the standardisation which was already taking place on the Continent, led to the Road Traffic Act of 1930 and to much greater central control. This Act, whilst maintaining local authorities' powers to put up signs, empowered the Minister to issue Statutory Regulations and Directions setting out what the size, colour and type of traffic signs should be and how they should be used. The Minister was also given powers to authorise special signs and to require signs to be erected or removed.

Following the report of the 1933 Committee, the first Statutory Regulations and Directions were issued in December of that year.

Since that date there have been numerous amendments to the Regulations and Directions, including those necessary to give effect to the improvements and additions recommended by the 1944 Committee. In the Road Traffic Act 1960 the law as to traffic signs was consolidated.

295. However, the basis of administration remains much the same as it became in 1930. That is to say, the initiative continues to rest with highway authorities who include the Minister for trunk roads and motorways. They have the power to put up traffic signs but this is permissive and there is no law requiring them to do so. It is left to their sense of responsibility and knowledge of local circumstances to provide such signs as they consider necessary for safety and traffic circulation. Those provided must, however, conform with the size, colour and type required by Regulations and with the injunctions as to use contained in the Directions. In addition, most prohibitory and some mandatory and warning signs require the Minister's agreement before they can be erected. This control is designed to ensure reasonable and uniform use of the important statutory signs (to ignore which may incur penalty) and particularly to prevent their proliferation to an extent which might reduce their value and result in their becoming disregarded by drivers and incapable of adequate enforcement by the police. To supplement these limiting and supervisory functions the law continues to give the Minister power, hitherto seldom used, to require signs to be put up or taken down.

From time to time memoranda of advice about traffic signs are issued by Departments to local authorities and to their own engineers in the field. These have been necessary in order to impart more extensive instructions on new problems than would have been possible in Statutory form. An example has been the application of double white lines and the appropriate signs for traffic control schemes necessitated by increasing urban congestion.

A further element of central control is exercised by making grants paid for traffic signs on classified roads conditional upon these signs conforming with Regulations and Directions.

296. Since there are some 1,300 authorities responsible for traffic signs as well as 9 Divisional Road Engineers of the Ministry of Transport in England and Wales and a Chief Road Engineer in Scotland, it seems inherent in the system that there should be considerable differences in treatment and efficiency as between the authorities concerned. Another reason for these differences is that despite the central power of Regulations, Directions, memoranda of advice and grants, many important matters are still left entirely to the judgment of highway authorities. While they are told, for example, the exact size of lettering to be used, they are left to make up their own minds as to the frequency with which signs should be erected in relation to traffic volume. They must decide whether a junction justifies the provision of advance direction signs and route confirmatory signs in addition to signs at the junction itself. It is left to them to judge how much signing is desirable in urban areas and what proportion of their roads should have warning lines, lane lines and 'catsyces'.

It is only to be expected that some authorities should be less interested in traffic signing than others, and that they should give it varying priorities amongst their many preoccupations and urgent calls upon an often over-worked staff. Some authorities may be deterred by expense.

By contrast a number of authorities have placed the greatest possible emphasis upon traffic signing as an essential part of traffic engineering and attend to the problem by having specialist traffic engineering units on their staffs. Others take steps to remedy urban clutter, including the contribution made by traffic signs, by inviting civic and amenity societies to advise them upon tidying-up schemes. Others are outstandingly good (or bad) in their attention to maintenance and siting of signs, to the elimination of obstructions (by tree lopping and hedge trimming for example) and to the principle of the continuity of signing.

297. This lack of uniformity in the application and in the efficiency of traffic signing as between responsible authorities has frequently been noticed and criticised in press and Parliament. For this reason proposals have sometimes been made that local highway authorities should cease to be responsible for traffic signs and that what is required to achieve the necessary uniformity in the interests both of safety and the convenience of road users is that all traffic signing should become the direct responsibility of Ministers, who, it has been suggested, should be advised by a committee consisting of leading traffic engineers, representatives of motoring organisations and the police.

But the opposite point of view continues to be voiced by local authorities who tend to complain that Ministers retain too much control over traffic signs. This attitude may be exemplified in complaints about Ministers' control over the erection of *Halt* signs and, more frequently, over the establishment of pedestrian crossings. These, it is claimed, are entirely matters of local safety which should be left to the judgment of the local Council.

298. Our own observations, as well as the criticisms made to us by the organisations we have consulted, leave us in no doubt of the importance of achieving greater uniformity in traffic signing. Undoubtedly there are at present considerable differences in standards and efficiency which could and should be avoided.

299. It may well be true that if the central control over traffic signs such as is at present exercised over them on trunk roads in the United Kingdom could

be extended to cover all roads, this would be capable of achieving a higher and more uniform standard of traffic signing and continuity of directional signing than at present exists. This may be so in theory, but we have come to the conclusion that complete centralisation in a country of the size of ours, having probably over one and a half million roadside signs as well as great lengths of carriageway markings, is not practical. Apart from the lack of staff available or likely to be available in any existing central organisation potentially capable of taking over this task, the local knowledge of the highway authority must remain very important. We thus see no alternative to leaving these authorities responsible for the initiative in and execution of the signing of their own roads within the framework of Departmental Regulations. We would not, however, advocate that prior central authorisation be abandoned over such important safety measures as *Stop* signs and pedestrian crossings in view of the very understandable tendency experienced in the past for these precautions, when left to the discretion of highway authorities, to be so frequently used that they lose their impact.

There are, however, a number of signs for whose erection the prior approval of the Minister, as at present required, is in our view quite unnecessary. Examples to which we have referred earlier in this report are the signs advising the use of low gear on hills and the unsuitability of certain roads for motor vehicles. Nor do we understand why some signs prohibiting the entry of certain vehicles should not be put up without further Ministerial approval once a prohibitory Order, already requiring the Minister's prior approval, has been made.

300. We also consider that the standard of traffic signing would improve if more emphasis could be placed by responsible authorities upon specialised attention to traffic engineering. Some of the larger councils have already set up Traffic Engineering Units which in the majority of cases have achieved most successful results. But many authorities have some reason to feel themselves to be too small to be able to release staff for such specialisation. This obstacle would be diminished if an arrangement could be reached among local authorities to share essential advisory services over an area large enough to warrant this treatment, and we recommend that urgent consideration be given to this.

But whatever may be done by local authorities for the improvement of their own technique and skills in traffic engineering, we believe that the greatest potentiality for achieving greater uniformity in traffic signing and a higher standard lies in the hands of central Departments. More positive guidance should, we think, be given in official Directions or memoranda as to the standards to be aimed at, particularly as to the frequency of signs and carriageway markings in relation to given traffic volumes; and to mounting and siting. We also feel very strongly that the provisions contained in Regulations and Directions, which are necessarily expressed in legal phraseology, would have much greater influence if they could be supplemented by a manual, explaining in simple terms readily comprehensible not only to lawyers but also to those who actually erect signs and lay carriageway markings, what is required and why it is needed. A manual of this kind could be interestingly and vividly illustrated by diagrams and photographs suggesting how particular problems, for instance, the signing of complex road junctions, should be treated. There is much else which could be more effectively put across in this manner than by present methods.

But the addition of more paper to the already long and complex official literature on road signs is not enough. Courses on traffic engineering should be more frequently organised and local authorities should be encouraged to be less reluctant in releasing staff to attend them. Maintenance grants should also be made conditional upon evidence being produced that a proper standard of inspection and maintenance was being applied to traffic signs.

We have considered whether the Highways Engineering Organisation in the field of the Ministry of Transport and the Scottish Development Department might not be assisted if both these Departments created central Traffic Signs Inspectorates in order to maintain a continuous survey of traffic signs throughout the country. This might help to impart a national focus to the problem and diminish the differences of emphasis and application of policy which tend to occur between the ten different areas in the United Kingdom. We came, however, to the conclusion that this form of additional supervision would probably complicate rather than assist the responsible Departments in their relations with local authorities and perhaps even with their own divisional staffs. Nevertheless we recommend that there should be closer surveillance by Departments of the signing of Primary routes to ensure that the higher standards which we have advocated for these routes should be effectively implemented.

As so many different authorities are responsible for the classified roads that will form part of the Primary routes there may be some difficulty in achieving uniformity of signing. The Departments will no doubt consult local highway authorities about the determination of the initial Primary route system and about procedures for achieving uniformity in the signing of Primary routes.

B. Change-over to Recommended Signs

301. It will be necessary in revised Regulations to prescribe the periods within which conversion to the new signs shall be completed.

We think our present signs should be modernised as quickly as possible. The new signs will be much more than an improved facility for road users. They will be a positive investment in road safety and better traffic flow, and will thus yield appreciable economic dividends.

302. We are satisfied that as far as productive capacity of the sign making industry is concerned conversion to the new signs recommended in this report could be completed throughout the country within five years from the date on which new Regulations come into force, and we recommend that total conversion in this time be made a requirement upon all highway authorities.

But all mandatory and prohibitory signs should be converted as quickly as possible and in any case within two years of the issue of new Regulations. This is important in order to obtain the speediest uniformity in signs which if not complied with entail legal penalties. Some confusion will result if two sets of these signs are in use at the same time. This could only be avoided by an overnight change-over which would be physically impossible. The co-existence of the old and new signs must therefore be accepted for a time and provision be made in law for both to be valid. But obviously this period should be as short as possible.

We recommend that on Primary routes there should be a complete conversion of all signs within three years. So far as possible the erection of the new directional signs on these routes should be phased together by co-operation between

the highway authorities involved so that discontinuity of directional signs is reduced to the minimum. A lack of uniformity during the transition would be less serious in the case of warning signs, and least so in the case of informative signs other than directional.

In advocating a complete modernisation of traffic signs within five years from the issue of new Regulations we have assumed that highway authorities will proceed immediately with such planning, survey and sign purchase as can be done in advance so that the erection of their new signs will be as little delayed as possible when revised Regulations are issued. This will certainly be necessary if the change-over is to be achieved within the time suggested and we regard this pre-planning as most important.

303. This radical transformation of traffic signs will of course entail considerable cost. We estimate that this will amount to about £22 million. It will fall upon central government in respect of trunk roads and grants payable on classified roads, whilst local government will incur the balance. The average cost throughout a five year conversion period of providing the new signs would be about 2½ times that of continuing with existing signs. However, this heavy initial expenditure should be offset by a considerably reduced annual cost for some years afterwards.

304. If for any reason, including expense, it were decided that a conversion period of longer than five years should be allowed for, we advocate that the priorities we have recommended should nevertheless be adhered to but that their permissible time limits should be extended proportionately.

C. Change-over Publicity

305. The transition to the new symbolic signs will need to be preceded and accompanied by an extensive and careful campaign of publicity to ensure that their meaning is known. This need has been underlined by the investigations made by the Social Survey. From the questions which they put to a sample group of drivers there is evidence that symbols which have already been used without words for years in this country, such as the chequer on directional signs and the speed limit derestriction sign, are still not fully understood by a considerable proportion of drivers. The need to ensure that the new symbols are learnt is obviously of the greatest possible importance to road safety.

An understanding of the signs should of course be a condition of passing any driving test but a more serious problem is to ensure they are learnt by those already qualified to drive; this is necessary also for cyclists and in some degree for pedestrians and all other road users. It would no doubt be impracticable to require all qualified drivers to pass a further test, but they could be required, as a condition of renewal of licence, to state not only that they have read the latest edition of the Highway Code (they are now required to certify only that they have read a copy of the Highway Code) but also that they have learnt and understood the meaning of the new signs. Before this could be done it would of course be necessary for the Highway Code to have been revised to contain illustrations and explanations of all the new symbolic signs and to be available in sufficient numbers for virtually the whole driving population of the country at a date well in advance of new Regulations being issued. In addition there should be an inexpensive brochure giving illustrations and meanings of all symbolic signs.

But many other forms of publicity, and repeated publicity over a period, will also be necessary before the new symbolic signs can be introduced. We hope that for this purpose the co-operation can be obtained of the press, radio and television authorities, schools, local authorities, motoring organisations, oil companies and motor car and tyre manufacturers in a planned and co-ordinated campaign to ensure that the public are better educated in the new symbolic signs than they evidently are at present in the existing symbols.

Detailed Summary of Recommendations

General

The 1949 Protocol system of traffic signs should be adopted in the United Kingdom but selectively and with design modifications (paragraph 37).

General Design Considerations

Lower-case letters with initial capitals should normally be used on traffic signs (paragraph 42).

There are a few special signs for which capital letters should be reserved (paragraph 43).

Only the alphabets shown in Appendix II should be used (paragraph 44).

The individual signs recommended are illustrated in Appendix II (paragraph 46).

With certain stated exceptions posts and other fittings should be grey; so too should the backs of signs (paragraph 47).

The colours recommended are specified in Appendix IV (paragraph 48).

The sizes recommended for warning, mandatory and prohibitory signs are given in Appendix VI (paragraph 49).

Review of Signs

A. Signs Giving Definite Instructions

(a) *Mandatory signs*

With the exception of the *Stop* and *Give way* signs the mandatory signs recommended have a white symbol on a blue circular background (paragraph 51).

The Protocol *Stop* sign is recommended. The Highway Code should emphasize its dual message, (i) stop, (ii) give way to traffic on the major road. The *Stop* sign should be used only at junctions where visibility is so bad that it is imperative to stop on every occasion (paragraph 52).

Instead of the present *Slow major road ahead* sign the Protocol inverted red triangle, but with the addition of the words 'Give way', should be used.

This sign should be given a legal mandatory significance. It should be used on all minor roads at their junctions with Primary roads in rural areas, at junctions where there is a considerable volume of traffic and at any other junction at which the highway authority considers it necessary (paragraph 53).

Other mandatory signs are recommended to indicate turn right (paragraph 54), turn right, one way only (paragraph 55), keep left, one way only (paragraph 56), keep left, dual-carriageway (paragraph 57), turn left, dual-carriageway (paragraph 58), turn left (paragraph 60), keep left (paragraph 61), minimum speed limit and end of minimum speed limit (paragraph 77). But one-way traffic should be indicated by an informatory sign (paragraph 59).

The range of signs to indicate one-way streets is recommended (paragraph 59).

The signs to indicate turn left and turn right should be internally lit when placed above traffic signals (paragraph 60).

(b) *Prohibitory signs*

The Protocol *No entry* sign should be used. This has no words (paragraph 64).

Signs are recommended for no right turn and no left turn. When used at signal controlled junctions these should be internally lit and mounted above the signals (paragraph 65).

The question of giving drivers a positive injunction e.g. 'turn right' rather than a negative e.g. 'no left turn' should be further studied. In the meantime the negative is preferred (paragraph 65).

Further individual prohibitory signs are recommended as illustrated in Appendix II. These indicate: prohibited all vehicles unless requiring access to premises in the road (paragraph 66); prohibited all vehicles except perambulators and hand propelled invalid chairs unless requiring access to premises in the road (paragraph 67); prohibited public service vehicles (paragraph 68); prohibited locomotives, tractors, heavy motor cars and motor cars with seats for more than 15 persons, unless requiring access to premises or land adjoining the road (paragraph 69); play street (paragraph 70); weight limit (paragraph 71); weight limit, only one motor vehicle on bridge (paragraph 72); speed limit for vehicles exceeding specified weight limit (paragraph 73); no cycling (paragraph 75); maximum speed limits and end of maximum speed limits (paragraph 76); school crossing patrol (portable sign) (paragraph 78); no overtaking (paragraph 79); no U turns, either locally or over a distance (paragraph 80); giving way at roundabouts (paragraph 81); priority to a vehicle from the opposite direction (paragraph 82).

(c) *Waiting restriction and limited parking signs*

A sign is recommended to indicate 'No stopping'. This would be appropriate for clearways. Detailed conditions in force on urban peak-hour clearways and the point where a clearway ends should be shown on plates below the clearway sign. To indicate 'No stopping' on short lengths of street or on corners yellow carriageway markings should be used rather than roadside signs (paragraph 85(i)).

A sign is recommended to indicate 'No waiting'. The periods during which waiting is prohibited should be shown in black lower-case letters on a white rectangular plate below the sign (paragraph 85(ii)). Limitations on loading and unloading should be indicated by black lower-case letters on a yellow rectangular plate below the sign (paragraph 85(iii)). When waiting is restricted to a limited

period this should be shown in white lower-case letters on a blue rectangular plate below the sign. If more than one of these messages is carried they should be on a single plate (paragraph 85(iv)). Where restriction of waiting is in force on different sides of the street on alternate days this should be indicated by a flap to the rectangular plate. Flaps should be secured in position to avoid interference (paragraph 85(vi)).

Where a time limit is imposed in a designated parking place it should be indicated on a plate below the informatory P sign. This plate should also show any restrictions imposed upon types of vehicles which may use the parking place and any conditions upon use of lights at night. The plate should not attempt to reproduce all the conditions of the parking place Order (paragraph 85(vii)).

Signs are recommended to indicate points of entry to and exit from a parking meter zone (paragraph 85(viii)).

Places where waiting is permitted for one hour or more should be designated parking places and thus indicated by the P sign, the prohibitory sign being confined to places where waiting is restricted to periods of less than an hour (paragraph 85).

Departments should urge local authorities to consider how waiting restrictions can be made simpler and more uniform and whether alternating waiting arrangements can be diminished or abolished (paragraph 86).

Waiting restriction signs should be placed at right angles to the street (paragraph 87(i)). Their message should be extended by yellow carriageway markings. The form of these should be decided in the light of current experiments (paragraph 87(ii)). The permitted distance between waiting restriction signs should be extended to 300 feet, subject to repeaters being placed near junctions. Intervals between peak-hour clearway signs should be 400 feet and rural clearway signs one mile, subject to repeaters being placed near junctions (paragraph 87(iii)).

Terminal waiting restriction signs should have beneath them a black arrow on a white plate pointing in the direction in which the restriction operates (paragraph 87(iv)). These arrows and the plates bearing details of restrictions should be parallel with the street (paragraph 87(v)).

The posts on which waiting and stopping restriction signs are mounted should be painted grey (paragraph 87(vi)). When possible these signs should be mounted on existing structures (paragraph 87(vii)).

B. Warning Signs

Warning signs should be distinguished by a red triangle containing a black symbol on a white ground (paragraph 88).

Junctions

The six symbols now prescribed in Regulations should continue to be used to give warning of junctions, but they should be placed within red triangles in Protocol form.

The two Protocol junction warning signs shown in Appendix III should not be used.

Use of the recommended map type advance direction sign, also the *Stop* sign and the *Give way* sign will often make the addition of junction warning signs unnecessary but their use will be determined by local conditions (paragraph 89).

Roundabouts

A sign is recommended to give warning of a roundabout. On high-speed dual-carriageway roads this should be supplemented by a plate bearing the words 'Reduce speed now' (paragraph 90).

Bends

Signs are recommended to give warning of bends. Where there are bends over a distance, this distance should be indicated by a supplementary plate. Further research should be done on the possibility of a notation on *Bend* signs to indicate the severity of the bend (paragraph 91).

Dangerous hills

A sign is recommended to indicate dangerous hills. It should be used at the top or at the foot of the hill as appropriate. When it is necessary to warn drivers to engage low gear or to keep in low gear, this should be indicated on plates below the sign. It should not be necessary for prior Ministerial approval to be given for use of these plates (paragraph 92).

Other warning signs

Further warning signs are recommended to indicate road narrows, narrow bridge (paragraph 93), single file traffic, single track road (paragraph 95), hump bridge (paragraph 96), low bridge, low bridge at a given distance ahead or in the indicated direction (paragraph 97), the headroom of a bridge (paragraph 98), concealed level crossing ahead (paragraph 99), level crossing with gates (paragraph 100), unguarded level crossing (paragraph 101), trains cross here (paragraph 102), uneven rails (paragraph 104), swing bridge (paragraph 106), gate or gates across road (paragraph 107), ford (paragraph 108), try your brakes (paragraph 109), sharp deviation of route (this black and white chevron marked barrier should also be placed on roundabouts liable to be approached at high speed) (paragraph 110), two-way traffic (paragraph 111), school and children (experiments should be done to produce a sign which will give an emphatic warning at times when children are actually crossing a road) (paragraph 112), children crossing ahead (paragraph 113), pedestrian crossing ahead (paragraph 114), traffic signals ahead (paragraph 115), cattle and stray animals (the use of these signs should continue to be controlled by the Minister) (paragraph 116), cattle grid, by-pass to cattle grid (paragraph 117), road liable to subsidence (paragraph 118), overhead cables and load gauges (paragraph 122), slippery carriageway (paragraph 123), low flying aircraft (paragraph 124), quay or river bank (paragraph 125), falling rocks (paragraph 126), sudden side wind (paragraph 127), other danger (paragraph 128).

Single track roads with passing places should continue to be indicated by the present signs until these require to be replaced. An informative sign in Protocol form should then be used (paragraph 105).

Special warning signs should not be used for homes for the aged or disabled (paragraph 121).

Continued use of the existing edge of carriageway hazard marker is recommended, but it should be permissible for it to carry a rectangular patch of reflecting material instead of reflecting studs. Wider use should be made,

especially on Primary roads, of edge markers as now used on motorways, but trials should be made to determine their best design, siting and spacing (paragraph 129).

C. Informatory Signs

(a) Directional signs

Primary routes should be distinguished by having green directional signs with white lower-case lettering and yellow route numbers. This would assist travellers to find their way. It might also enable a code of improved driver conduct to be attached to Primary routes. On all other roads legends should be black on white. Letter heights should be based on vehicle speeds and road layout (paragraph 136).

Certain criteria are recommended for the selection of Primary routes (paragraph 137). These are likely to be predominantly trunk and class I roads.

Primary routes should avoid urban centres, but this will only be possible where complete ring roads exist. Urban Primary routes should be kept as few and as simple as possible (paragraph 138).

Directional signs on Primary routes should have a dark background because, as on motorways, this makes it possible to reflectorise the legend only and to have large signs without detriment to amenity. Blue should be reserved for motorways. The dark green of B.S. 2660 No. 6-074 is recommended because it is the most satisfactory colour in urban as well as rural environments and because continuity of directional sign colour throughout Primary routes is important (paragraph 140).

Lettering of place names on directional signs should always be in lower-case with initial capitals and route letters in upper-case (paragraph 141).

The letter heights recommended for all-purpose roads are divided into four groups. These are in Appendix V (paragraph 141).

All names on directional signs should be in lettering of the same size, an exception may be admitted only for long names which cannot be abbreviated or hyphenated (paragraph 142).

Route numbers and letters on Primary routes should be yellow and equal in height to the capital letters used on the sign (paragraph 143).

Route symbols should indicate the layout of the junction or roundabout. The relative importance of the intersecting routes should be indicated by different widths of the arms of the symbol (paragraph 144).

Instead of the existing chequer symbol to denote routes which may be joined indirectly, brackets should be used round the route number. These brackets should be yellow on Primary routes, black on other roads (paragraph 145).

On Primary routes the place names carried on directional signs should normally be confined to the next place of traffic importance. Departments should decide what places rank as places of traffic importance (paragraph 146).

A place name once mentioned on any class of directional sign should continue to be shown on that class of sign until it is reached (paragraph 146).

Rules for the design of direction signs are at Appendix VIII. These rules will be amplified in the light of experience and when issued must be followed by highway authorities and signmakers (paragraph 147).

Owing to the great safety value of indicating the layout of a junction visually, as is done by map type advance direction signs, a sign in stack form should be used only where there is not enough space for a sign in map form. But local advance direction signs should always be in stack form (paragraph 148).

More guidance should be given by Departments to local authorities as to when a road junction should have advance direction signs and route confirmatory signs as well as direction signs. Criteria should take into account vehicle speeds and volume of traffic (paragraph 149).

Advance direction signs

Advance direction signs on Primary routes should show place names in white and route numbers in yellow even when the place referred to is not on a Primary route; when the place is reached via a motorway the motorway letter and number should be in yellow. If a place indicated is on a road leading to a motorway the motorway route letter and number should be in brackets. Similarly on the black-on-white advance direction signs recommended for all-purpose roads other than Primary roads motorway numbers should be shown in black (paragraph 150).

The word 'Airport', or the name of the airport, may be shown on advance direction signs (paragraph 150).

Local advance direction signs should be distinguished by a blue surround of 4 stroke-widths, and be always in stack form (paragraph 151).

Direction signs

Direction signs should be rectangular with one end pointed. They should repeat the place name or names and route numbers on the advance direction sign. When there is no route confirmatory sign they should also give the mileage. They should be set at drivers' eye level. If the junction is wide enough they should be mounted separately at each exit; otherwise on a single post. They should be in lower-case lettering and be reflectorised unless externally lit. On Primary routes, direction signs should be white on green when indicating places on Primary routes, but otherwise black on white, save when indicating a motorway when they should be white on blue with motorway letters and numbers. If the advance direction sign carries a route number in brackets this should be repeated on the direction signs (paragraph 152).

There should be more directional signs at junctions in urban areas (paragraph 153).

Route confirmatory signs

Route confirmatory signs should repeat the information on the advance direction sign and add mileages. But where the road continues for a considerable distance under the same route number, route confirmatory signs should also include up to three, or exceptionally four, names and distances of places on the numbered route other than those shown on the advance direction sign, provided they are within 150 miles or so. These should be shown in the order in which they are reached. Places off the numbered route should be included only if they are major cities and are within about 15 miles of the numbered route. In this case both the place name and its mileage should be shown in brackets.

Confirmatory signs should be mounted at drivers' eye level, and be placed where their message can be absorbed, normally between 75 and 150 yards beyond the junction. They should be used at junctions where traffic volumes justify a main advance direction sign (paragraph 154).

Ring roads

A sign is recommended to indicate ring roads and this should be used at frequent intervals to emphasize continuity of ring roads (paragraph 155).

Local junction names

When a junction is well known by a local name it should be within the discretion of the highway authority to indicate it by the addition of the local name on a rectangular plate at the upper edge of the advance direction signs before the junction. These local names should be in capital letters but in the same colour combination as the rest of the sign (paragraph 156).

Place names

When it becomes necessary to renew place name signs the black-on-white colour scheme should be retained but the names should be in Transport Heavy capitals of the same height as those on the direction signs on the same road. Place name signs should not include forward destinations and mileages. If the place is part of a town, the town should be in smaller letters above the place. Place name signs should be sited at the beginning of the built-up area. Where in urban areas it is found more convenient for a place name to be indicated above an advance direction sign on or near the boundary of the district, this should be in the same form as recommended in paragraph 156 for local junction names (paragraph 157).

County boundaries and National borders

Signs indicating county boundaries and national borders should be prescribed as traffic signs in similar form to place name signs, and the inclusion of local or national crests should be permitted (paragraph 158).

Public footpaths and bridleways

Existing prescribed signs, which make a clear distinction between a footpath and a bridleway, should continue to be used. They should as a rule give destinations and mileages (paragraph 159).

Roads used as public paths

Old roads which have fallen into disrepair should not be signposted as footpaths or bridleways since they are legally accessible also to motor vehicles. They should be marked with black on white direction signs with an additional designation such as 'Cart track' (paragraph 160).

(b) Other informative signs

Other informative signs recommended are for single track road with passing places (paragraph 105), cyclists only (paragraph 162), no through road for motor vehicles, no through road for pedestrians (paragraph 163), road unsuitable for motor vehicles (paragraph 164), one-way street (paragraph 165), alternative route (paragraph 166), dual-carriageway ahead (paragraph 167), dual-carriageway (paragraph 168), keep to nearside lane except when overtaking (paragraph 169), advance information of prohibitions such as no entry, weight limit, no right or left turn (paragraph 170), lay-by (paragraph 171), passing place (paragraph 172), pass either side (paragraph 173), traffic census (paragraph 174),

toilets (paragraph 175), service establishments (paragraph 176), ancient monuments and National Trust properties (paragraph 177), hospital (paragraph 178), direction to railway stations, docks, bus stations, police stations, hospitals and cathedrals (paragraph 179), fire rendezvous point (paragraph 180), off-street car parks, free car parks, garage parking, coach parks, picnic areas (paragraph 181), in, no exit, out, no entry (paragraph 183), pedestrian subway (paragraph 186), second train coming (paragraph 187), river names (paragraph 188), telephone (paragraph 189), camping and caravan sites (paragraph 190), youth hostel (paragraph 191).

D. Temporary Signs

(a) Sign required by obstructions on the highway

Road works

There should be a single Traffic Safety Code indicating for roads of all speeds the signs to be used for obstructions and emergencies and the way to use them (paragraph 193). Instead of *Slow* an appropriate speed limit sign should be used. Explicit information as to the nature of the obstruction should be given by the first sign. This should be followed by information about the distance to the obstruction and the amount and extent of the carriageway obstructed. Protocol signs and traffic cones should be used on the approach to an obstruction and a sign indicating 'Road clear' after it (paragraph 194).

Signs are recommended to indicate loose chippings, wet tar, temporary road surface, ramp, pass either side, look right/left (paragraph 195).

Fewer warning signs of road works should not be put up because the works are of short duration or because the obstruction is moved forward as work progresses (paragraph 196).

Authorities responsible for road works should ensure in advance that their contractors are aware of the Code and they should make it a condition of contract that the correct warning signs are properly erected and afterwards removed. Penalties for breach of this condition should be enforced (paragraph 197).

Alternate one-way working past an obstruction should be controlled by traffic signals where traffic is dense or at extended obstructions; by manually operated *Stop* and *Go* signs where traffic is not dense and obstructions are small and of short duration; and, where the above means are not justified, by signs indicating the direction in which traffic has priority. Red and green flags should cease to be used (paragraph 198).

Accidents and emergencies

In the case of accidents or other emergencies a warning should first be placed well in advance of the obstruction. Next the obstruction itself should be very clearly marked (paragraph 199).

When Regulations are made to allow drivers to place on the carriageway an advance warning sign in case of breakdown or accident involving obstruction, a red reflectorised triangle is recommended for this purpose (paragraph 200).

Signs to give advance warning of ice and fog are recommended (paragraph 201).

Highway authorities should be reminded that it is their responsibility to ensure that obstructions on their roads are properly signed and that the signs are not left up after the obstruction has been removed (paragraph 202).

(b) Signs erected by the motoring organisations

Motoring organisations should continue to be authorised to put up temporary signs and to use their own badges and colours. These signs should normally not remain up for more than six months (paragraph 203).

Signs indicating the telephone boxes and service centres of motoring organisations are not temporary and should be prescribed as traffic signs (paragraph 204).

(c) Signs erected by the police

Police signs should conform with Regulations. Police waiting restriction signs should be confined to two; for portable purposes a blue pyramidal sign is recommended with white or silver lettering; for fixing for longer periods, e.g. to lamp posts, a blue plate with white lettering. Signs are recommended with which the police should indicate 'Stop' and 'Slow'. The use by the police of a blue flashing beacon at accidents should be permitted (paragraph 205).

(d) Signs erected by highway authorities

Traffic diversions should be indicated by highway authorities by black on white direction signs in lower-case lettering and including the word 'Diversion'. Conformity of signing throughout diversions is important.

When temporary mandatory or prohibitory signs are used they should be in the same form as the permanent sign.

Where roads have been made slippery by agricultural or industrial operations a temporary warning sign is recommended for use until the fouling can be removed.

Temporary warning signs should follow the Protocol in form (paragraph 206).

(e) Other temporary signs

A sign is recommended to indicate 'Stop for weight check' (paragraph 207).

A flashing red light should not be used to give warning of need for special care. A flashing amber light should be used instead. The supporting structure should be marked with red and white sloping bands—not black and white, as at present allowed.

The use of temporary flashing beacons should be permitted to the police, highway authorities, motoring organisations and the Road Research Laboratory; and to road contractors with the consent of the appropriate highway authority (paragraph 208).

E. Miscellaneous Signs

(a) Bollards

In any revision of the British Standard on bollards more attention should be given to performance standards and local authorities should ensure that the bollards they purchase conform with these standards (paragraph 210).

A designer should be appointed to design a new bollard and should bear in mind that the bollard should not be so high as to obscure small children or block the line of sight of drivers in low-seated cars; that conspicuousness by night and day should be improved, tests being done to determine the relative advantages of white and amber lighting; that resistance to impact by vehicles should approximate to that of present box-type bollards; that there should be

a standard base fixing so that all bollards are interchangeable; and that there should be a link ensuring that electric supply is disconnected in the event of collision. There should be extensive field trials to ensure that the final design is both functionally and aesthetically satisfactory (paragraph 211).

When the best design for a bollard has been attained all bollards should conform in appearance and strength. But manufacturers should be given freedom of choice in materials and construction provided performance standards are met (paragraph 211).

The accepted bollard should be prescribed as a traffic sign (paragraph 211).

A large internally illuminated mandatory arrow should be used instead of a bollard on roundabouts or islands in high speed roads when the sign required is too large to be incorporated in the head of a normal bollard (paragraph 212).

(b) Refuge indicator lamps

Refuge indicator lamps are useful and should be retained. Their posts should be of the same colour as the local street lighting columns, except at zebra crossings where they should continue to be painted with black and white bands. Their lamps should not be so bright as to distract drivers or be a substitute for street lighting lamps (paragraph 213).

(c) Traffic cones

A uniform standard for traffic cones should be prescribed in Regulations (paragraph 214).

(d) Bus stop

There should be a uniform bus stop sign which should be prescribed in Regulations (paragraph 215).

(e) Street name plates and house numbering

There should be a higher standard in the use of street name plates and house numbering (paragraph 216).

(f) By-passed towns

Traffic signs should not be used to indicate services in by-passed towns and villages. Where necessary these should be indicated by advertisements off the highway (paragraph 217).

F. Authorised Signs

No change is recommended in the present policy and system of authorising signs but authorised signs should follow the shape, colour, design and size, also the same principles of lighting, mounting and siting as are recommended for other roadside signs (paragraphs 219 and 220).

G. Carriageway Markings

Junction markings

At the great majority of junctions the minor road should be distinguished from the major by a distinct carriageway marking (paragraph 223).

For this purpose a transverse broken double white line is recommended for use halfway across the mouth of the minor road supplemented by a longitudinal warning line. In the case of one-way roads the transverse lines should be wholly across the mouth of the road. The longitudinal warning line should not be used where the carriageway is less than 18 feet wide (paragraph 224).

This marking should be used always where there is a roadside *Give way* sign and as widely as possible at other junctions not controlled by traffic signals, police or *Stop* signs. It should be prescribed as a warning sign and should be explained in the Highway Code as having the meaning 'proceed so as not to cause inconvenience or danger to traffic on the major road' (paragraph 224).

Transverse solid white lines should be reserved for use with traffic signals and *Stop* signs and where there is police control. It should be permissible to use a wider transverse solid white line than at present (paragraph 225).

Double white lines

The present double white line system is thought to be a valuable aid to safety if used with discretion and no change in its form is recommended. But there should be a greater use of offset double white lines on long three-lane hills. Double white lines should not be used on the approach to roundabouts, pedestrian crossings or road junctions. Subject to current experiments the use of offset double white lines to allocate the centre lane of three-lane roads alternately to opposite streams of traffic seems likely to be useful on winding roads but if used on straight, level roads would not be observed by drivers (paragraph 226).

Warning lines

A more emphatic hazard warning marking is required and trials should be carried out to determine how this should be achieved.

Warning lines at the approaches to junctions and other hazards should more frequently be extended beyond the minimum length now recommended (paragraph 227).

Lane lines

Lane lines and edge of carriageway markings on fast all-purpose roads should be more emphatic (paragraphs 228 and 229).

Other markings

The word 'Slow' should continue to be allowed as a carriageway marking to supplement roadside warning and advance direction signs as necessary (paragraph 231).

As an advance warning of a *Give way* sign it should be permissible to paint a hollow white inverted triangle or the words 'Give way' on the carriageway whichever is found by experiment to be the more effective (paragraph 232).

The word 'Stop' should always be used on the carriageway to supplement the roadside *Stop* sign. 'Halt' should cease to be used (paragraph 233).

The words 'Bus stop', 'Taxi rank', 'Look right/left' should continue to be used in their present form (paragraph 234).

There should be more use on the carriageway of direction arrows and place names. They should be set well back from the junction and should be within lane lines (paragraph 235).

The words 'Keep clear' should continue to be used on the carriageway where a junction is liable to be blocked by traffic held up by a railway level crossing or at a junction ahead (paragraph 236).

The words 'Ambulances only' and 'School entrance' should continue to be authorised where necessary (paragraph 237).

Colour and surface texture of markings

Edge of carriageway markings should continue to be white. Broken white, and not broken yellow, lines should be used to divide clearways from their lay-bys (paragraph 238).

The use of coloured road surfaces particularly at junctions should be further investigated: also improved methods of producing coloured carriageway markings (paragraph 239).

All carriageway markings should have a skid-resistant surface. Stainless steel plates as carriageway markings should be replaced by white lines (paragraph 240).

Higher standards of road marking

There should be greater use of road markings (paragraph 241). 'Catseyes' are the most effective type of reflector and should be widely used but there is also scope for greater use of ballotini reflectorised lines. Both should be used for double white lines.

Where there is no street lighting during the whole or part of the night, use of both 'catseyes' and reflectorised lines should be considered for longitudinal markings on heavily trafficked roads and where fog is prevalent or conditions are dangerous.

On lightly trafficked roads and roads not subject to fog, plain lines and 'catseyes' may be sufficient depending on traffic conditions.

On roads lit throughout the night plain lines will normally be appropriate (paragraph 242).

'Catseyes'

'Catseyes' should be reserved for use in longitudinal markings and not be used in stop lines.

More experiments should be done with the use of alternate white and yellow 'catseyes' in warning lines (paragraph 243).

Maintenance

Restoration of road markings should take place more quickly after road repairs (paragraph 244).

H. Traffic signals

The replacement of fixed time by vehicle actuated signals should continue until no fixed time signals remain (paragraph 245).

There should be wider use of selective control of complicated junctions by green arrows but multiple green arrows should not replace the full green signal to indicate that movement in all directions is possible.

There should be more advance signs and carriageway markings to help drivers to move early enough into the appropriate lane and particularly to avoid misuse of a filter lane (paragraph 246).

Signals on high-speed roads should be more conspicuous. Overhead signals may be necessary on these roads. These signals should, if possible, be suspended from existing structures, but if a special gantry is necessary it should be designed with regard to amenity (paragraph 248).

Overhead signals may also be necessary to control tidal flow, showing a vertical green arrow to indicate movement permitted and a red cross to indicate that movement is prohibited. These signals should be repeated at intervals of not more than 300 yards. They should not be so placed that they can be confused with signals controlling intersections (paragraph 248).

Highway authorities should more frequently review, and if necessary have removed, distracting lights placed in the line of traffic signals. The use of backing boards may assist conspicuity; when used they should be black. Signal heads should be entirely black instead of banded as now. The design of signal heads should be improved (paragraph 249).

The growth of traffic, especially in urban areas, makes it necessary to give pedestrians more help in crossing the road safely.

There should be more use of vertical green arrows to prevent turning traffic and during this time to allow pedestrians to use the parallel crossing safely.

At complex junctions the general rule should be that pedestrians should watch the traffic and that turning traffic should give way to crossing pedestrians.

The *Cross* signal to pedestrians should be in white and be indicated by a symbol.

At certain junctions additional signals should be installed for the assistance of pedestrians.

Where there are one-way systems signal heads facing away from the traffic should be masked so as to show a small cross so that pedestrians can be warned before traffic starts to move (paragraph 251).

I. Pedestrian Crossings

In place of the metal studs now used at pedestrian crossings a non-skid, durable and visible material should be used (paragraph 253). The present zebra markings and amber flashing beacons are satisfactory and no change is recommended (paragraphs 254 and 255).

The beacon posts should continue to be painted with black and white bands for the sake of emphasis and in the interest of pedestrian safety (paragraph 256).

Other Considerations

A. Illumination

Regulations should be amended to require a considerably higher standard of illumination of traffic signs.

All warning, mandatory and prohibitory signs other than waiting restriction signs but including all speed limit signs other than repeaters, and all advance direction signs should be illuminated by direct lighting wherever there is street lighting. This direct lighting should be maintained throughout the night even

if the street lighting is switched off or reduced for part of the night. Where there is no street lighting it should be permissible for these signs either to have direct lighting or to be reflectorised.

Turn left and *Turn right* signs should be internally illuminated at all times.

At all important junctions on Primary roads there should be direct lighting of directional, prohibitory and mandatory signs. It should be left to the discretion of highway authorities to decide whether directional and other important signs should be externally or internally illuminated.

Informatory signs which do not justify the expense of direct external lighting should be placed where they are most visible after dark under the street lighting.

All temporary prohibitory and warning signs and most temporary informative signs should if possible be reflectorised (paragraph 259).

Reflecting material is greatly superior to reflecting lenses for the illumination of the characters and symbols of traffic signs. Reflecting material should be used to illuminate the whole background of all unlit black on white directional signs. Partial reflectorisation is not satisfactory (paragraph 260).

Tubular fluorescent lamps should more often be used to illuminate the larger signs. These should be mounted below the sign but if risk of interference exists they should be mounted above it (paragraph 262).

British Standard No. 873 should be reviewed without delay (paragraph 262).

Sign lighting lanterns should be mounted so that distracting stray light is not shed behind the sign and so that they avoid, as far as possible, casting shadows on the face of the sign in sunlight (paragraph 263).

B. Siting and Mounting

Distance and spacing

The correct distance between a sign and its junction will depend on vehicle speeds and road conditions. New signs should be mounted at the distances indicated in Appendix VII (paragraph 264).

Where a *Reduce speed now* plate is necessary beneath a roundabout warning sign this should be placed on the central reservation 500 yards from the roundabout and be repeated at 440 yards on the nearside verge (paragraph 266).

Height

Signs should be mounted as far as possible at the eye level of the driver of an average private car. Their lower edge should be 3 to 5 feet above the highest point of the carriageway.

When a sign is liable to be obscured by, or to obstruct, pedestrians it should have a clearance above the ground of 6 feet 9 inches (paragraph 268).

Clearance from the edge of the carriageway should never be less than 1 foot 6 inches in urban areas and 4 feet on high-speed dual-carriageway roads (paragraph 270).

Signs should be so sited that they are not obscured by tree or hedge growth (paragraph 271).

If a sign is liable not to be seen against its background it should be given a special surround (paragraph 271).

Reflectorised signs should be so mounted that they can be seen in dipped headlights (paragraph 272).

Alignment

Specular reflection should be avoided by turning signs 5° away from oncoming traffic on straight roads.

Waiting restriction signs should be mounted at right angles to the road and on top of their posts. But supplementary plates should be set parallel to the carriageway (paragraph 273).

No entry signs should be set so as to face drivers attempting to enter the street (paragraph 274).

Method of mounting

The smaller signs should be fixed when possible to existing posts or walls, but should remain conspicuous. Round posts should be used. If enlargement of the post is necessary to contain equipment it should be at the base. The post should not show above the sign (paragraph 275).

Between a sign and the plate beneath it there should be a space sufficient to avoid impairing the outline of the sign (paragraph 276).

Overhead mounting

Overhead mounting may be necessary in heavily trafficked urban streets when roadside signs and carriageway markings are liable to be obscured (paragraph 277).

Duplication of signs

No entry signs should continue to be placed on both sides of the street. *No right/left turn* signs attached to primary traffic signals should be duplicated on the signals, if any, on central refuges (paragraph 278).

Advance directions signs should be placed on the central reservation, provided it is wide enough, of all high-speed dual-carriageway roads, as well as on the nearside (paragraph 279).

Position of directional signs in relation to junctions

On the approaches to grade separated junctions on roads built to near-motorway standards there should be two map type advance direction signs, one half a mile before the junction and the other at the beginning of the deceleration lane. On the first the forward destination should be omitted and the distance to the junction added.

Direction signs at roundabouts should be so located as not to prevent drivers from seeing traffic coming from the right (paragraph 280).

C. Three-dimensional Aspects of Sign Design

Ministers' control

Ministers should control more closely the three-dimensional design of signs. Manufacturers should employ experienced designers (paragraph 281).

Appearance of the backs of signs

The back of the sign and its bracing should be neat and unobtrusive (paragraph 282).

D. Materials for Sign Construction

The ease with which some signs are twisted and bent suggests that standards are inadequate or are not complied with. Compliance with British Standard No. 873 should be made a condition of purchase (paragraph 283).

Further trials should be made to test the qualities of vitreous enamel in sign construction. There should also be trials of plastics and laminated glass fibre. Tubular steel posts have advantages for the mounting of signs (paragraph 284).

E. Maintenance

To accept the lowest tender for the supply of traffic signs is not always economic since higher first costs may be justified by savings on maintenance (paragraph 285).

The maintenance of signs should be improved. They should be regularly cleaned and painted. Lower mounted signs will need more frequent cleaning (paragraph 286).

Traffic signals and sign lighting equipment should be checked by specialist staff and inspected at night (paragraph 287).

Carriageway markings require constant inspection and renewal (paragraph 288).

Trees and hedges liable to obscure signs should be kept cut (paragraph 289).

F. Sign Clutter

The tidying up of urban streets can result in traffic signs becoming more visible. Planning authorities should ensure that traffic signs are not obscured or impaired by advertisements.

New signs should be well arranged and those superseded should be removed (paragraphs 291 and 292).

Administration

A. General Considerations

It is most important that there should be greater uniformity in traffic signing (paragraph 298).

Complete centralisation is not practical. Local highway authorities should continue to be responsible for the initiative in and execution of the signing of their own roads within the framework of Departmental Regulations. But central authorisation of *Stop* signs and pedestrian crossings should continue (paragraph 299).

Local authorities should place more emphasis upon specialised traffic engineering. Departments should give more positive guidance as to the frequency of signs and carriageway markings, their mounting and siting in relation to traffic speeds and volumes. Official Regulations and Directions should be supplemented by an illustrated and simply expressed manual. There should be more courses on traffic engineering and adequate opportunity for local authority staff to attend them. Maintenance grants should be made conditional upon proper inspection and maintenance of signs. There should be closer surveillance by Departments of the signing of Primary routes (paragraph 300).

B. Change-over to Recommended Signs

Total conversion should take place within five years from the date on which new Regulations came into force. But all mandatory and prohibitory signs should be changed within two years. All signs on Primary routes should be changed within three years. Co-operation between the highway authorities responsible for Primary routes will be necessary to ensure that the erection of directional signs on these routes is properly phased. Highway authorities should proceed immediately with such planning, surveying and purchasing as can be done in advance of new Regulations (paragraph 302).

This radical transformation of traffic signs will cost some £22 million. The average cost throughout the five year conversion period would be about 2½ times that of continuing with existing signs but there will be considerably reduced annual expenditure for some years following (paragraph 303).

If a conversion period of more than five years is adopted, the recommended priorities should be retained but should be extended proportionately (paragraph 304).

C. Change-over Publicity

Extensive and careful publicity will be necessary before and during the change-over to ensure that the new symbolic signs are understood. Knowledge of the new signs should be required at driving tests, and those already qualified to drive should be required to state, when renewing their licences, that they have read the latest edition of the Highway Code and that they understand the new signs. Revision of the Highway Code to include these signs and production of a brochure illustrating them will be necessary.

The co-operation of press, radio, television, schools, local authorities, motoring organisations and oil, motor car and tyre companies is hoped for in any publicity campaign (paragraph 305).

Acknowledgments

The comments on existing traffic signs sent to us at our invitation by organisations interested in this problem, have been most helpful, and we are grateful to them for their co-operation.

The investigations and experiments conducted by the Road Research Laboratory have been of basic importance to this report and our thanks are due, not only to Mr. Moore and Mr. Christie, who were members of the Working Party, but also to the other members of the staff of the Laboratory, for their assistance in the preparation and demonstration of signs both on the roadside and in simulated conditions to test various lighting.

To Mr. Jock Kinneir, our designer, we are grateful for assisting us with so many difficult problems of design and for the production of sign layouts and alphabets.

We wish to express our appreciation of the help we received from the Working Party, which was admirably led by Mr. T. G. Osborne. They had to give great attention to detail and they bore the long hours of work cheerfully.

In conclusion we would like to pay tribute to our Secretary, Miss J. E. Chamberlain, who has borne a very heavy burden with great ability and endurance.

Signed on behalf of the Committee,

Walter Worboys
Chairman

Joan Chamberlain
Secretary, 18th April, 1963.

Appendix I

List of Organisations Consulted

(see paragraph 27)

Association of Municipal Corporations
Association of Road Traffic Sign Makers
British Road Federation Ltd.
British Transport Commission
British Travel and Holidays Association
Central Conference of Chief Constables
Civic Trust
County Councils Association
Council for the Preservation of Rural England
Council of Industrial Design
Institution of Highway Engineers
Institution of Municipal Engineers
Institute of Transport
London Transport Executive
Municipal Passenger Transport Association
National Association of Parish Councils
National Road Transport Federation Ltd.
Passenger Vehicle Operators Association Ltd.
Pedestrians' Association for Road Safety
Public Transport Association
Royal Fine Art Commission
Royal Society for the Prevention of Accidents
Rural District Councils Association
Standing Joint Committee on Cycling
Standing Joint Committee of the R.A.C.—A.A.—R.S.A.C.
Transport and General Workers Union
Urban District Councils Association

Appendix II

ILLUSTRATIONS OF RECOMMENDED SIGNS

(see paragraph 50)

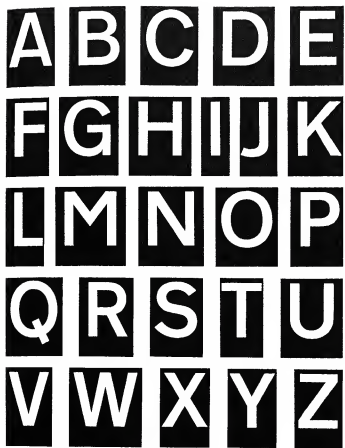


Fig. 1. Transport Medium capital alphabet for use on signs with dark backgrounds. (Paragraphs 44 and 141 and Appendix VIII.)



Fig. 2. Transport Medium lower-case alphabet for use on signs with dark backgrounds. (Paragraphs 44 and 141 and Appendix VIII.)

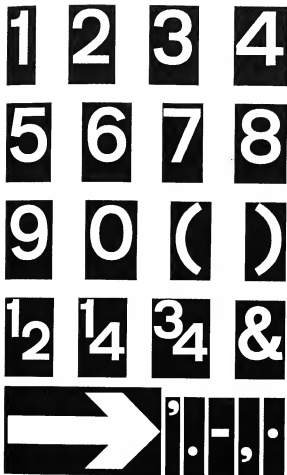


Fig. 3. Transport Medium numerals and other characters for use on signs with dark backgrounds. (Paragraph 44 and Appendix VIII.)

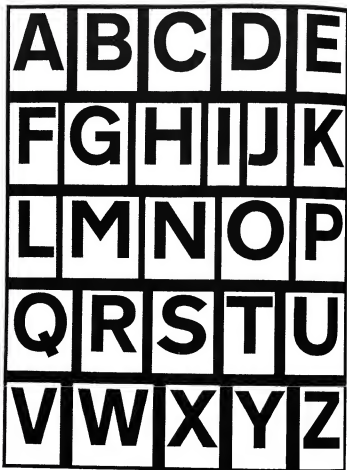


Fig. 4. Transport Heavy capital alphabet for use on signs with white backgrounds. (Paragraphs 44 and 141 and Appendix VIII.)



Fig. 5. Transport Heavy lower-case alphabet for use on signs with white backgrounds. (Paragraphs 44 and 141 and Appendix VIII.)

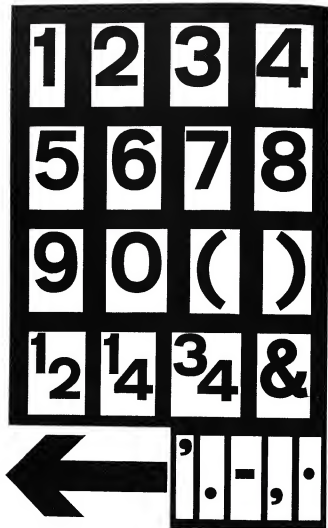


Fig. 6. Transport Heavy numerals and other characters for use on signs with white backgrounds. (Paragraph 44 and Appendix VIII.)

A. SIGNS GIVING DEFINITE INSTRUCTIONS



Fig. 7. Stop and give way.
(Paragraphs 52 and 224.)



Fig. 8. Give way. (Paragraphs 53, 81
and 224.)



Fig. 9. No right turn. (Paragraph 65.)



Fig. 10. No left turn. (Paragraph 65.)



Fig. 11. No U turns. (Paragraph 80.)



Fig. 12. Turn right.
(Paragraphs 54, 56, 58, 60 and 65.)



Fig. 13. Turn left at junction.
(Paragraphs 54, 58, 59 and 65.)

(The direction of the arrow may be changed as required.)



Fig. 12a. Plate for use with sign at
fig. 12. (Paragraph 55.)

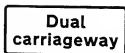


Fig. 13a. Plate for use with signs at
figs. 12 and 13. (Paragraph 58.)



Fig. 14. Keep left.
(Paragraphs 57, 61, 168, 194 and 211.)



Fig. 15. No entry.
(Paragraphs 64 and 168.)



Fig. 16. Prohibited all vehicles in both directions, (Paragraphs 67 and 70.)



Fig. 17. All motor vehicles prohibited.
(Paragraph 66.)

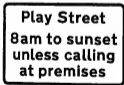


Fig. 16a. Plate for use with sign at fig. 16. (Paragraph 70.)

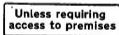


Fig. 17a. Plate for use with sign at fig. 17. (Paragraphs 66 and 69.)



Fig. 18. Buses and coaches prohibited. (Paragraph 68.)



Fig. 19. Cycling prohibited. (Paragraph 75.)



Fig. 20. Weight limit. (Paragraphs 69, 71 and 72.)



Fig. 20a. Plate for use with sign at fig. 20. (Paragraph 72.)



Fig. 21. Axle weight limit.
(Paragraph 69.)



Fig. 22. Width limit. (Paragraph 69.)



Fig. 23. Priority to vehicles from the
opposite direction. (Paragraph 82.)



Fig. 24. No overtaking.
(Paragraphs 79 and 194.)



Fig. 25. No waiting.
(Paragraphs 84 and 85.)



Fig. 25a. Plate showing hours during which waiting is prohibited.
(Paragraph 85.)



Fig. 25b. Plate showing (above) hours during which waiting is prohibited and (below) hours during which loading and unloading are prohibited. (Paragraph 85.)



Fig. 25c. Plate showing complete prohibition on loading and unloading.
(Paragraph 85.)



Fig. 25d. Plate showing hours during which waiting is permitted for 20 minutes in any hour. (Paragraph 85.)



Fig. 26. No stopping.
(Paragraphs 84 and 85.)



Fig. 26a. Plate showing end of prohibition on stopping.
(Paragraphs 80 and 85.)



Fig. 27. Speed limit.
(Paragraphs 76 and 194.)



Fig. 28. End of speed limit.
(Paragraphs 76 and 161.)



Fig. 29. Speed limit.
(Paragraph 73.)

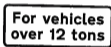


Fig. 29a. Plate for use with sign at
fig. 29. (Paragraph 73.)



Fig. 30. Minimum speed limit.
(Paragraph 77.)



Fig. 31. End of minimum speed limit.
(Paragraph 77.)

B. WARNING SIGNS



Fig. 32. Cross roads. (Paragraph 89.)



Fig. 33. T junction. (Paragraph 89.)



Fig. 34. Side road. (Paragraph 89.)



Fig. 35. Staggered junction.
(Paragraph 89.)

(The symbols may be reversed.)



Fig. 36. Roundabout. (Paragraph 90.)



Fig. 37. Bend to the right.
(Paragraph 91.)
(The symbol may be reversed.)



Fig. 36a. Plate for use with sign at
fig. 36 on high speed roads.
(Paragraph 90.)



Fig. 38. Double bend, the first to the
left. (Paragraph 91.)
(The symbol may be reversed.)



Fig. 39. Series of bends.
(Paragraph 91.)



Fig. 40. Sharp deviation of route to the left, for use on roundabouts and at dangerous bends. (Paragraph 110.) (The chevrons may be reversed according to direction.)



Fig. 41. Road narrows. (Paragraphs 93 and 194.)



Fig. 42. Dual carriageway ends. (Paragraph 111.)



Fig. 41a.



Fig. 43. Two-way traffic. (Paragraph 111.)

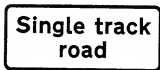


Fig. 41b.

Plates for use with sign at fig. 41. (Paragraph 95.)



Fig. 44. Two-way traffic across a one-way carriageway. (Paragraph 111.)



Fig. 45. Steep hill. (Paragraph 92.)



Fig. 46. Hump bridge. (Paragraph 96.)

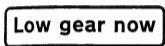


Fig. 45a.

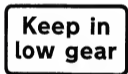


Fig. 45b.



Fig. 47. Uneven road.
(Paragraphs 104 and 118).

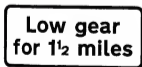


Fig. 45c.

Plates for use with sign at
fig. 45. (Paragraph 92.)



Fig. 48. Level crossing with gate or barrier. (Paragraph 100.)



Fig. 49. Level crossing without gate or barrier. (Paragraph 101.)



Fig. 50. Children. (Paragraph 112.)



Fig. 51. Pedestrian crossing ahead. (Paragraph 114.)



Fig. 50a.

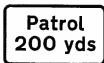


Fig. 50b.

Plates for use with sign at
fig. 50. (Paragraphs 112 and 113.)



Fig. 52. Traffic signals ahead.
(Paragraph 115.)



Fig. 53. Slippery road.
(Paragraphs 123 and 206.)



Fig. 54. Cattle. (Paragraph 116.)



Fig. 55. Sheep. (Paragraph 116.)



Fig. 56. Horses or ponies.
(Paragraph 116.)



Fig. 57. Wild animals.
(Paragraph 116.)



Fig. 58. Opening or swing bridge.
(Paragraph 106.)



Fig. 59. Quayside or river bank.
(Paragraph 125.)



Fig. 60. (Paragraphs 108 and 206.)



Fig. 61. (Paragraph 109.)
(For use on the reverse side of sign at
fig. 60.)



Fig. 62. (Paragraph 107.)



Fig. 63. (Paragraph 117.)

Fig. 63a. Plate for use with sign at
fig. 63. (Paragraph 117.)





Fig. 64. Height limit. (Paragraph 97.)

Fig. 64a. Height limit chord marking. (Paragraph 98.)



Fig. 65. Overhead cable. (Paragraph 122.)



Fig. 66. Sudden side winds. (Paragraph 127.)



Fig. 65a. Plate for use with sign at fig. 65. (Paragraph 122.)



Fig. 67. Low flying aircraft or sudden aircraft noise. (Paragraph 124.)



Fig. 68. Falling rocks. (Paragraph 126.)



Fig. 69. Other danger.
(Paragraphs 128, 199 and 201.)

Blasting

Fig. 69a. Plate indicating nature of other danger, for use with sign at fig. 69. (Paragraph 128.)

Plates for use with warning signs.

For 2 miles

Fig. 70. Example of plate giving distance over which hazard extends.
(Paragraphs 79, 80, 91, 116 and 118.)

(For use with signs at figs. 11, 24, 39, 47, 53, 54, 55, 56 and 57)

1 mile

Fig. 71.

400 yds

Fig. 72.

Examples of plates giving distance to hazard. (Paragraphs 97, 114, 115, 171 and 194.)

(For use with signs at figs. 51, 52, 60, 64 and 134)

250 yds



Fig. 73. Example of plate giving distance of and direction to hazard.
(Paragraph 97.)

(For use with signs at figs. 60 and 64)

C. INFORMATORY SIGNS

(a) Directional Signs



Fig. 74. Advance direction sign for simple cross roads.
(Paragraph 148.)

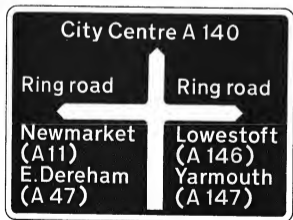


Fig. 75. Advance direction sign for use at junction with ring road. (Paragraphs 148 and 150.)



Fig. 76. Advance direction sign for use $\frac{1}{2}$ mile before grade-separated junction. (Paragraphs 148 and 280.)



Fig. 77. Advance direction sign for use at beginning of deceleration lane at grade-separated junction. (Paragraphs 148 and 280.)



Fig. 78. Advance direction sign for complex junction. The relative importance of each road is shown by differing the width of the route symbol. (Paragraphs 144, 148 and 150.)

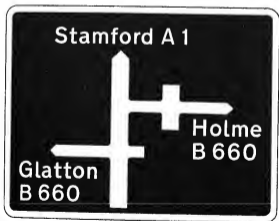


Fig. 79. Advance direction sign for use at junction of side turnings with dual-carriageway road. (Paragraph 148.)



Fig. 80. Advance direction sign for roundabout junction.
(Paragraph 148.)



Fig. 81. Advance direction sign for roundabout junction of
all-purpose roads with motorway. (Paragraphs 148 and 150.)



Fig. 82. Advance direction sign for complex junction. (Paragraphs 148 and 150.)

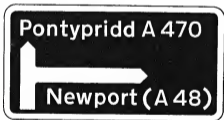


Fig. 83. Advance direction sign for side turning. The brackets mean that the numbered route lies in the direction indicated. (Paragraph 148.)



Fig. 84. Advance direction sign for staggered junction.
(Paragraph 148.)



Fig. 85. Stack type advance direction sign. (Paragraph 148.)

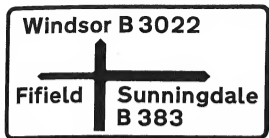


Fig. 86. Advance direction sign for cross roads junction of non-Primary routes. (Paragraph 148.)

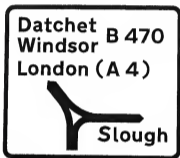


Fig. 87. Advance direction sign for junction of non-Primary routes. (Paragraphs 148 and 150.)



Fig. 88. Stack type advance direction sign for non-Primary routes. (Paragraph 148.)

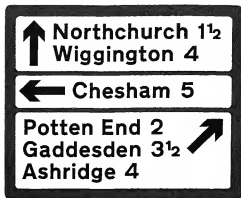


Fig. 89. Local advance direction sign including mileages. (Paragraphs 148 and 151.)

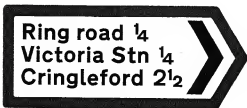


Fig. 90. Local direction sign with mileages. (Paragraph 152.)

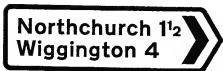


Fig. 91. Direction sign for use on non-Primary routes. (Paragraph 152.)



Fig. 92. Direction sign to airport. (Paragraph 152.)



Fig. 93. Route confirmatory sign. (Paragraphs 154 and 280.)



Fig. 94. Direction sign. (Paragraphs 152 and 280.)



Fig. 95. Direction sign to motorway, for use on all-purpose roads. (Paragraph 152.)



Fig. 96. Ring road repeater sign. (Paragraph 155.)

(b) Other Informatory Signs

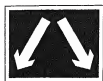


Fig. 97. Pass either side.
(Paragraphs 59, 173, 195 and 211.)



Fig. 98. One way traffic. (Paragraph 59.)



Fig. 99. One way street. (Paragraphs 59 and 165.)



Fig. 100. Cyclists only. (Paragraph 162.)



Fig. 101. No through road.
(Paragraph 163.)



Fig. 102. No through road (advance
sign). (Paragraph 163.)



Fig. 103. (Paragraph 164.)



Fig. 104. (Paragraph 166.)



Fig. 105. (Paragraphs 167 and 170.)

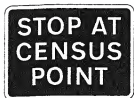


Fig. 106. (Paragraph 174.)

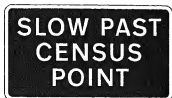


Fig. 107. (Paragraph 174.)



Fig. 108. (Paragraph 174.)



Fig. 109. Toilets. (Paragraph 175.)



Fig. 110. Men's toilet. (Paragraph 175.)



Fig. 111. Ladies' toilet. (Paragraph 175.)



Fig. 112. (Paragraph 178.)



Fig. 113. Direction to hospital. (Paragraph 179.)



Fig. 114. Public telephone. (Paragraph 189.)



Fig. 115. Parking place. (Paragraphs 85, 171 and 181.)



Fig. 115a. Plate for use with sign at fig. 115 at entrance to picnic area. (Paragraph 181.)

Fig. 115b. Plate for use with sign at fig. 115 at coach park. (Paragraph 181.)

Fig. 115c. Plate for use with sign at fig. 115 at free car park. (Paragraph 181.)



Fig. 116. Direction to free car park. (Paragraph 181.)



Fig. 117. Direction to garage parking. (Paragraph 181.)



Fig. 118. Picnic area ahead. (Paragraph 181.)



Fig. 119.



Fig. 120.



Fig. 121



Fig. 122.

Figs. 119 to 122 inclusive are signs for use on private and other premises near the highway. (Paragraph 183.)

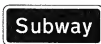


Fig. 123. Entrance to pedestrian subway. (Paragraph 186.)



Fig. 124. Camping site (tents).
(Paragraph 190.)



Fig. 125. Camping site (caravans).
(Paragraph 190.)



Fig. 126. Camping site (tents and
caravans). (Paragraph 190.)



Fig. 127. Youth hostel. (Paragraph 191.)

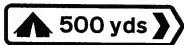


Fig. 128. Direction and distance to camping site (tents).
The symbol may be varied as appropriate. (Paragraph 190.)



Fig. 129. Entrance to parking meter zone. (Paragraph 85.)



Fig. 130. Exit from parking meter zone. (Paragraph 85.)



Fig. 131. River name. (Paragraph 188.)



Fig. 132. Priority over vehicles from the opposite direction. (Paragraphs 82 and 196.)



Fig. 133. Nearside lane for traffic turning left only. (Paragraphs 246 and 265.)

D. TEMPORARY SIGNS



Fig. 134. Road works. (Paragraph 194.)



Fig. 135. (Paragraph 195.)



Fig. 136. (Paragraph 195.)



Fig. 137. (Paragraphs 119 and 195.)



Fig. 138. (Paragraph 195.)



Fig. 139. Warning of traffic coming from an unexpected direction (the legend may read "Pedestrians look right"). (Paragraph 195.)



Fig. 140. (Paragraph 198.)



Fig. 141. End of temporary obstruction. (Paragraph 194.)



Fig. 142. (Paragraphs 78, 199, 205 and 207.) (The legend may be amended to read "Stop. Children" or "Stop. Weight check".)



Fig. 143. (Paragraphs 199 and 205.)

Appendix III

TWO PROTOCOL SIGNS NOT RECOMMENDED

(Paragraph 89)



Fig. A



Fig. B

Appendix IV

Standard Colours to be used for Signs, Posts and Fittings

(see paragraph 48)

Red	. . . . .	British Standard 381C No. 537
Blue	. . . . .	British Standard 2660 No. 0-013
Yellow	. . . . .	British Standard 381C No. 355
Green (for directional signs)	. . . . .	British Standard 2660 No. 6-074
Green (other than for directional signs)	. . . . .	British Standard 381C No. 225
Grey	. . . . .	British Standard 2660 No. 9-101
Black	}	as specified in Clauses 3b and 3c of British Standard No. 873: 1959
White		

Appendix V

Table of Letter Heights for Directional Signs

(see paragraph 141)

<i>Type of road</i>	<i>'x' height of letters of advance direction signs</i>	<i>'x' height of letters of direction and route- confirmatory signs</i>
(a) Dual-carriageway roads built to near-motorway standards	10 inches	8 inches
(b) Unrestricted dual-carriageway and single three-lane carriageway roads a mile or more in length	8 inches	6 inches
(c) Other dual and single-carriageway trunk and classified roads and wide urban roads	6 inches	4 inches
(d) Other urban roads and all unclassified roads	4 inches	4 inches

("x" height" means the height of the lower-case letter x)

Appendix VI

Table of Sizes for Warning, Mandatory and Prohibitory Signs

(see paragraph 49)

Type of sign	Inches of letter height used on advance direction signs			
	Specially reduced size	3-4	6-8	10-12
Warning sign (base of triangle)	—	30 in.	60 in.	90 in.
Mandatory and prohibitory signs (diameter)	20 in. (for repeater signs and in urban areas)	24 in.	48 in.	72 in.
Halt sign (diameter).	—	30 in.	60 in.	90 in.

Appendix VII

Table of Siting Distances for Advance Direction and Warning Signs

(see paragraph 264)

<i>Average speed of private cars in m.p.h.</i>	<i>Distance of sign from intersection in feet (assuming level road)</i>
30	150
40	300
50	500
60	750
70	1,000

Appendix VIII

Rules for the Design of Road Signs

(see paragraph 147)

Alphabets

(i) There are two alphabets for use on traffic signs and no others should be used. They are the Transport Medium and Transport Heavy alphabets (figures 1 to 6).

(ii) Each alphabet comprises capital and lower-case letters, numerals and associated characters, and each of these is placed on a tile to assist in spacing.

(iii) The Transport Medium alphabet is for use only for light (white or yellow) letters on a dark (blue, green or red) ground, and the Transport Heavy alphabet is for dark letters on a light ground.

(iv) Letter size shall be expressed as inches of 'x' height, which is the height of a lower-case letter 'x' within the alphabet concerned. The height of capitals should normally be expressed in terms of the 'x' height of the alphabet from which they are taken, for example, 'capitals from the 4 inch "x" height alphabet'. Where, however, capitals alone are used on a sign they may be described in terms of their actual height.

(v) Stroke-width, referred to as S/W, is the thickness of the capital letter I in the Transport Medium alphabet whatever size of alphabet is being used on the sign. This stroke-width is never based on the Transport Heavy alphabet.

Layout of Signs

A. General

(i) All dimensions are expressed in terms of stroke-widths.

(ii) Spaces are measured between the tile edges of letters (and never between the letters themselves), but direct to symbols, borders and arrows.

(iii) All place names on a sign shall be in letters of the same size, regardless of the relative importance of the place. A smaller letter size may only be used for a name which is too long to fit into a reasonable sized sign and which cannot be hyphenated or abbreviated.

(iv) Route letters and numbers shall be from the same size alphabet as is used for the related place name.

B. Letter and word spacing

(i) Words are formed by butting tiles closely together.

(ii) Tiles of words stacked one above the other shall be butted closely together (but see also C (iv) (g)).

(iii) Related words on the same line, as in a phrase, shall be separated by $1\frac{1}{2}$ S/W.

(iv) Route letters and route numbers shall be separated by $1\frac{1}{2}$ S/W.

(v) Route letters shall be 2 S/W away from place names when on the same line.

(vi) There shall be 3 S/W between a route number and a bracketed route number on the same line.

(vii) When a two-word place name has to occupy two lines the words shall be centred on one another.

C. Map type advance direction signs (other than for roundabouts)

(i) *Borders*

- (a) These shall be $1\frac{1}{2}$ S/W wide.
- (b) They shall be radiused 2 S/W on internal corners.

(ii) *Route symbols*

- (a) The width of the route symbol shall be 6 S/W when indicating a Primary road, $2\frac{1}{2}$ S/W for a class III or unclassified road and 4 S/W for all other classified roads.
- (b) The tips of route symbols shall be chamfered 90° .
- (c) Internal angles at the junction of route symbols shall be radiused 1 S/W.
- (d) Side turning route symbols shall extend to two-thirds of the distance from the forward symbol to the border.

(iii) *Relation of elements*

- (a) Route numbers should follow place names on the same line. If space does not permit this they shall be placed below and aligned with the initial of the place name or if this is impracticable be aligned with the last letter of the place name.
- (b) When there is more than one destination related to a route symbol all place names shall be stacked, with their initial letters aligned.
- (c) Forward destination(s) shall be centred over forward route symbols.
- (d) Exceptionally, on a sign with only one side turning the forward destination should be above the route symbol but may be displaced from centre to range right or left with the outside extremity of the right or left turning destination.
- (e) Back and side destinations shall normally be below route symbols but very exceptionally may be placed above route symbols when the forward destination is 18 S/W distant.
- (f) Route numbers and place names shall be a minimum of 4 S/W from an unrelated oblique route symbol.

(iv) *Spacing of elements*

- (a) There shall be $2\frac{1}{2}$ S/W between the top border and the forward destination.
- (b) There shall be $2\frac{1}{2}$ S/W between side borders and place names or route numbers.
- (c) There shall be $1\frac{1}{2}$ S/W between the bottom border and the nearest place name or route number but 1 S/W when there are no descenders in the bottom line.
- (d) There shall be a minimum of 4 S/W between the vertical route symbol and the nearest place name or route number laterally.
- (e) There shall be $1\frac{1}{2}$ S/W between route symbols and the place names below.
- (f) Forward route symbols shall butt up directly to forward destinations, but where there is a descender immediately over the symbol point a stroke thickness should be inserted.
- (g) There shall be a minimum of 12 S/W vertically and 10 S/W horizontally between blocks of names/route numbers.
- (h) The bottom of the forward route symbol shall be $1\frac{1}{2}$ S/W from the bottom border.

D. Map type advance direction signs for roundabouts

(i) Dimension of roundabout symbols

Number of roads	Internal radius	External radius	Length of entry arm	Minimum length of route symbol from centre of roundabout
1 entry + 3 exits	7	12	22	24
1 entry + 4 exits	8	13	30	30

(ii) When it is more economical on roundabout signs especially where there is a group comprising more than one destination and route number, destinations may be placed to one side of an oblique route symbol, but see especially C (iv) (g).

(iii) The minimum distance between the route entering a roundabout and destinations to left and right shall be 6 S/W on the left and 5 S/W on the right.

(iv) There shall be a minimum of 2 S/W between a destination and the nearest point on the perimeter of a roundabout symbol.

E. Stack type signs

(i) Where a border is of the same colour as the letters it shall be $1\frac{1}{2}$ S/W.

(ii) Between panels divisions of letter colour shall be 1 S/W.

(iii) Blue borders on local advance direction signs shall be 4 S/W.

(iv) Between panels on blue bordered signs divisions shall be blue and $1\frac{1}{2}$ S/W.

(v) Internal corners of panels shall be radiused 1 S/W. External corners of sign plates shall be radiused 2 S/W.

(vi) Within panels, the border shall be separated from the top and sides by $2\frac{1}{2}$ S/W and from the base by $1\frac{1}{2}$ S/W.

(vii) Figured mileages shall follow place names on the same line and shall be at a distance of 3 S/W from them.

(viii) Route numbers shall be placed below place names and aligned with the initial of the place name.

(ix) Groups of place names/route numbers within panels shall be separated vertically by 1 S/W.

(x) Arrows shall be of a size appropriate to the alphabet.

(xi) Arrows shall be on the left of forward and left-turn destinations and to the right of right-turn destinations. Arrows for other than right-angle turns shall be set at 45° .

(xii) Arrows shall be centred vertically on related destinations however numerous these may be.

(xiii) Forward pointing and oblique arrows shall be 3 S/W from side borders.

(xiv) Side pointing arrows shall be $1\frac{1}{2}$ S/W from borders.

(xv) Vertically pointing arrows if related to a single place name shall be reduced to 11 S/W in length.

(xvi) Destinations or route numbers shall be $2\frac{1}{2}$ S/W from arrows.

F. Direction signs

(i) The appropriate end of the sign plate shall be chamfered 120° , the pointed end being radiused 1 S/W.

(ii) A chevron of the letter colour shall be placed vertically at a distance of $3\frac{1}{2}$ S/W from the end border and $1\frac{1}{2}$ S/W from the top and bottom borders.

(iii) $1\frac{1}{2}$ S/W shall separate the chevron from the nearest destination in any direction.

(iv) Where used on signs with 1 line of information chevrons shall be $3\frac{1}{2}$ S/W wide, with 2 lines of information 4 S/W wide, 3 lines $4\frac{1}{2}$ S/W wide and 4 lines 5 S/W wide.

G. Route confirmatory signs

(i) Route numbers shall be centred over place names and mileages.

(ii) Place names shall be ranged left.

(iii) Mileages shall follow related place names on the same line and shall be ranged right.

H. Supplementary plates and Informatory signs (other than directional signs)

(i) The lines of legend shall be centred one over the other.

(ii) The borders of the plates shall be 1 S/W.

(iii) Internal corners shall be radiused 1 S/W.

(iv) Any panels shall be separated by a horizontal line $\frac{3}{8}$ S/W wide.

(v) Supplementary plates should be placed below the sign to which they relate at a distance of an 'x' height of the lettering on the plate.

I. Table of measurements of stroke-widths

The following table shows the measurement in inches of the more commonly used multiples of stroke-widths.

S/Ws	'X' HEIGHT								
	1"	2"	2½"	3"	4"	6"	8"	10"	12"
1	.24	.47	.59	.71	.95	1.43	1.90	2.37	2.85
1½	.36	.71	.89	1.07	1.43	2.14	2.85	3.56	4.28
2	.47	.95	1.19	1.43	1.90	2.85	3.80	4.75	5.70
2½	.59	1.18	1.48	1.78	2.38	3.56	4.75	5.94	7.13
3	.71	1.42	1.78	2.14	2.85	4.27	5.70	7.12	8.55
4	.95	1.90	2.38	2.85	3.80	5.70	7.60	9.50	11.40
5	1.19	2.37	2.97	3.56	4.75	7.12	9.50	11.87	14.25
6	1.43	2.85	3.56	4.28	5.70	8.55	11.40	14.25	17.10
7	1.66	3.32	4.16	4.99	6.65	9.97	13.30	16.62	19.95
8	1.90	3.80	4.75	5.70	7.60	11.40	15.20	19.00	22.80
9	2.14	4.27	5.35	6.42	8.55	12.82	17.10	21.37	25.65
10	2.38	4.75	5.94	7.13	9.50	14.25	19.00	23.75	28.50
12	2.85	5.70	7.13	8.56	11.40	17.10	22.80	28.50	34.20
13	3.09	6.17	7.72	9.27	12.35	18.52	24.70	30.87	37.05
20	4.76	9.50	11.88	14.25	19.00	28.50	38.00	47.50	57.00
30	7.13	14.25	17.82	21.39	28.50	42.75	57.00	71.25	85.50

