Road Design and Road Safety

THE causation of road accidents and the measures which can be devised for their prevention are subjects of close study all over the world, but despite all the efforts which have been made, the fact has to be faced that in Great Britain, during the past ten years, a daily average of nineteen persons have lost their lives on the roads. This gives emphasis to the importance of a paper published, with the discussion to which it gave rise, in the *Journal of the Institution of Civil Engineers* (December, 1936), entitled "Road Design and Road Safety", and presented by Mr. Frederick C. Cook, chief technical adviser to the Ministry of Transport.

A lengthy examination of the statistics of the problem was made. As was suggested in the discussion, it is to be regretted that the records and investigations are confined to fatal accidents, as the fuller information obtainable in the other and more numerous cases might be expected to shed more light on causation. From these figures, the outstanding facts are that in 1935 the number of persons killed on the roads in Great Britain was 6,477, of whom 3,079, or forty-eight per cent, were pedestrians, and that the total number of vehicles involved was 8,730, of which the largest number in any one class, 2,513, or twenty-nine per cent, refers to private cars. On referring the figures either to a basis of 100,000 vehicles licensed in each class or to each 100,000 estimated vehicle-miles, the author shows the private car to be the least responsible, public conveyances being most culpable on the first basis and motor-cycles on the second. Examination of the published official figures reveals that in view of the complexity of the problem and the number of factors involved, they are inadequate to lead to reliable conclusions. For example, it is indicated that fully half the fatal accidents occurred on straight roads ; yet here, where it might be that there were the elements of a clear case to decide as between road, car and driver, no analysis is given.

Going on to deal with the design of roads, the author considers and explains the influence of speed, desirable widths of carriage-ways, segregation of different classes of traffic and provision of dual ways, service roads, cycle tracks and footpaths, and their relation to traffic conditions. Such details of construction as the radius of curves, super-elevation, visibility, gradient and crossfall or camber are discussed and suitable minimum or maximum values recommended. In relation to the lay-out of road intersections, the author discusses the relative merits of a traffic signal installation, a roundabout, and a fly-over junction, and, of the last, illustrations were given both of a simple type and of one of the clover-leaf pattern.

With the view of obtaining a satisfactory road surface, testing of roads and materials and research are being continuously carried on, and it is hoped that asphaltic and bituminous coverings will be devised capable of maintaining non-skid properties for many years. Among the conclusions reached by the author, the most prominent are that the overwhelming majority of accidents are due to the personal element, that the main contributing cause is the simultaneous use of the road by motor vehicles, horse transport, pedal cyclists and pedestrians, and that, as the mechanically propelled vehicle is the most destructive agent, the most effective safeguard is the provision of special ways for its exclusive use.

Also appearing in the same volume is an abridged report of a paper—"A Study of the Underground Road Crossings of Paris"—contributed by M. Gaston Bardet, in which he gives particulars of the subways built when the fortification belt of 1814 was converted into a circular boulevard. Some unexpected problems were encountered in these, notably owing to the dazzling glare reflected by the glazed stoneware lining from ventilation apertures. In one subway the electric lighting is controlled by photo-electric cells, so that the internal intensity is synchronized with that outside. Consideration of the varying degrees of visibility to which the eye of the driver has to be adapted led to the arrangement of zones of graduated lighting in lengths of sixteen yards, and while incandescent lamps had been employed in some cases, the monochromatic character of the sodium light was found to make it more easy to regulate.

In Road Research Bulletin No. 1 (H.M. Stationery Office, 1936. 9*d*. net), G. Bird and W. J. O. Scott describe the construction and operation of a machine for accurately comparing the 'slipperiness' of surfaces. This has been developed at the Road Research Laboratory of the Department of Scientific and Industrial Research, and consists of a motor-cycle and side-car in which the wheel of the latter, by being set at an angle to the direction of travel, introduces a skid component into its motion relative to the road. Dynamometers are carried which record the transverse and vertical forces on the wheel, the ratio of these giving a 'sideway force co-efficient' analogous to 'co-efficient of friction', by which the non-skid properties of road surfaces can be compared. The technique of testing by means of the machine is explained and typical results quoted. The apparatus has been in use for a number of years, and having been brought to a sufficiently high degree of development is recommended for use by road engineers or surveyors to measure and compare for themselves the frictional properties of the road surfaces for which they are responsible.

Road Research Technical Paper No. 1, by the same authors (H.M. Stationery Office, 1936. 1*s*. 6*d*. net), the first of a series of studies in road friction, summarizes the results of a large number of measurements of resistance to skidding, made under varying climatic conditions and at different speeds on roads of several types, by means of the machine previously referred to. The main facts which emerge from these tests are : dry, clean road surfaces, free from loose material, give a high coefficient at all speeds and may be regarded as non-skid ; on wet surfaces the figure decreases as the speed increases and in most cases is subject to seasonal variation, being higher in winter than in summer ; in a dry-wet-dry cycle, the co-efficient decreases rapidly to a minimum, increases slowly to a fairly constant value until drying commences, when it begins to rise to the normal dry surface value. It is also shown that, notwithstanding greater first cost, improved results and ultimate economy can be obtained from close attention to technique in construction of road surfaces in the light of the information derived from these tests.