The principal advantages of concrete pavements are as follows :—

(1.) As far as can be judged, they are durable under ordinary suburban and rural traffic conditions :

(2.) They present a smooth, even surface, which offers very little resistance to traffic :

(3.) They are practically dustless, and may be easily cleaned :

(4.) They may be maintained at comparatively small cost :

(5.) They may be made to serve as a base for some other type of surface when resurfacing becomes necessary.

The principal disadvantages are :—

(1.) They are somewhat noisy under steel-tired traffic :

(2.) They are subject to cracking, and wherever a crack develops it must be given frequent attention in order to prevent deterioration of the pavement :

(3.) On account of the sharp line of separation between the pavement and the shoulders, and the marked difference in hardness, an abrupt and dangerous depression is sometimes formed at the edge of the pavement, which reduces the effective width of roadway :

(4.) The difficulty of reinstatement after any disturbance of the road has taken place (this objection applies more particularly to city work).

Most of the secrets of the success of a concrete road centre around the care bestowed upon the selection, proportioning, mixing, and laying of the various materials. The cement should be regularly tested. Sand should come up to the usual specifications for concrete-work, except that much more attention should be paid to the grading of the particles. The Bureau of Public Roads recommends the following grading :—

	Per Cent.
Passing ¼ in. screen	100
Passing ¼ in screen and retained on No. 10 sieve	5 to 25
Passing No. 10 and retained on No. 50 sieve	5 to 90
Passing No. 100 sieve, not more than	10
Weight removed by elutriation test, not more than	3

The coarse aggregate of stone should be clean, and have a French coefficient of wear of at least 7. If gravel it should not show a greater loss than 12 per cent. under the abrasion test. Attention should also be paid to the grading of the coarse aggregate, the object being to obtain as dense a mixture as possible. The Bureau of Public Roads recommends the following grading for the coarse aggregate :—

	Per Cent.
Passing 2 in. screen	100
Passing 2 in. and retained on 1 in. screen	25 to 60
Passing ¼ in. screen, not more than	10

The method of proportioning by voids is used in England. In America Fuller's method is much used. In practice it is generally not feasible to follow strictly any of the theories in the proportioning of the materials, as conditions vary so frequently. A set of tables compiled from experiments by Professor Abrams is generally used on the job in the United States. They give a large number of satisfactory combinations of variously graded coarse and fine aggregates.

The most up-to-date methods of laying and curing concrete roads in America can be gathered most satisfactorily by perusing the extract from a 1924 specification, forming Enclosure C to this report.

The two chief sets of tests carried out in recent years on concrete pavements were the Bates tests and the Pittsburg tests. It is very significant that the designs evolved as being the most economical from both these tests are practically identical. These designs are being widely adopted through the United States as standards. The main features are : (1) The pavement is 6 in. thick except for 2 ft. from each edge, where the thickness gradually increases until at the edge it is 9 in. ; (2) a longitudinal centre joint with deformed bars acting as dowels on pavements 18 ft. or over in width. With inferior foundations and more than the average rural traffic the pavement-thickness is, of course, increased. When an intensity of heavy lorry traffic of 150 per day is anticipated 8 in. is regarded as the minimum thickness. A crown of 2 in. in an 18 ft. pavement is used.

A peculiar feature of a concrete pavement was disclosed by the above tests. It was found that the slab curled upwards at the edges during the night. This means that it is possible for water to get access to the subgrade. It was also observed that the early-morning lorry traffic did the most damage to the road.

The worst failures which I saw in California were crow's-foot cracks at the edges of the pavements or at the corners of slabs, and would certainly seem to indicate the necessity for greater thickness at the sides.

The question of expansion and contraction joints has never been satisfactorily solved. One of the most noted English authorities at the last International Road Congress stated that "the cracks formed by expansion and contraction of concrete through temperature, moisture, and subsoil changes cannot be eliminated by the provision of expansion-joints." The majority of plain concrete pavements in America are now constructed without transverse joints. They are considered unnecessary if the concrete is laid when the air-temperature is not below 50° F.

Bituminous Surfacings.—When concrete roads were first made a bituminous carpet was usually applied with the idea of forming a wearing-surface and reducing the impact on the slab. This practice is now being generally discontinued. It is found that a bituminous surface approximately ¼ in. in thickness has little, if any, cushioning-value, and consequently does not lessen the impact to any appreciable extent. The chief advantage of such a treatment lies in the fact that cracks are automatically bridged over as they appear, and surface water is prevented from reaching the subgrade through these cracks. The difficulty of securing proper adhesion of the bituminous surface to the concrete, its cost, and the necessity for continuous maintenance, constitute its greatest disadvantages. In both America and England it is being recognized that these disadvantages greatly outweigh any possible advantages that might be obtained through its use. An example of a very unsatisfactory surfacing of this type may be seen in Napier at the present time.