wide concrete gutter was built on each side, making a total width of pavement of 20 feet. Condition of entire section is excellent.

The same report listed some experimental sections in Indiana which have been inspected this year and the following conditions noted

Indiana near South Bend on the Lincoln Highway, the six samples referred to in this report went through the winter in splendid condition except No. 1 which disintegrated slightly. It was patched this spring and looks to be in very good condition at this time. No. 5 which was a bituminous macadam disintegrated quite extensively.

It is not believed, however, that the disintegration of either of these two types necessarily condemns them We would be more inclined to ascribe their partial failures to poor work, as will be demonstrated by the next paragraph

Indiana near Indianapolis, State Road 37 The section of road described here went through the winter in good condition None of it is breaking up even though it was only 1-inch deep On the other hand, the old concrete surface which has not been coated, broke up quite badly and is just at this time being resurfaced with six different types of surface

It was originally planned to use eight different types of surface about one-quarter mile long each as follows

One-inch bituminous concrete (Cold mix made with emulsified asphalt)

One-inch bituminous concrete standard hot mix

One and one-half-inch bituminous concrete (Amiesite hot mix, laid cold)

Three-inch bituminous macadam

One-half-inch rock asphalt on a 3-inch bituminous macadam base using only one application of bituminous material on the base

One-inch rock asphalt

Four-inch reinforced concrete

Five-inch reinforced concrete

It was finally decided to omit the two concrete sections and substitute in their stead the 1-inch emulsified asphalt

IV REDUCTION IN THICKNESS OF GRAVEL ROADS UNDER DIFFERENT TRAFFIC AND EFFECT OF DUST PALLIATIVES

It is a well-known fact that the amount of gravel disintegration, or that which is worn out and blown away from a gravel road surface under traffic, varies with the kind and amount of traffic on the road

While it is extremely difficult to determine this amount of gravel, a very close approximation can be made by tabulating the amount of gravel that has been used for a period of years on any one section of road and which at the end of the period of years, has about the same thickness of gravel as when the tabulation commenced

The effect of dust palliatives in preserving this gravel is well known However, the extent of such effect is a variable amount and would depend on the grade and amount of dust palliatives used as well as the density of traffic No well defined statistics have yet been prepared with reference to the amount of gravel saved in the use of the dust palliatives except where a good bituminous surface has been produced on gravel roads, in which case the amount of gravel saved would be that used in the ordinary gravel maintenance less the amount of gravel required each year to cover the annual bituminous surface treatments.

However, some careful statistics have been prepared on the amount of gravel used on various sections of road for a period of three years. These statistics have been worked up from three individual sources in the State of Indiana and by three independent individuals and are shown in Table I. The amount of gravel that was used in the past three years on these various sections of road was tabulated and the average daily traffic on the sections of road was in some cases estimated It is unfortunate that an accurate count of such traffic could not have been furnished, however, even in the absence of this the approximation is such as to give some idea of the gravel lost on an ordinary gravel surface each year under variable traffic conditions

It is interesting to note how close the amounts of gravel required in the three separate districts are to each other This tabulation shows that on an average 0 289 cubic yards gravel are worn away each year by an average daily traffic of one vehicle, or that 0 00079 cubic yards of gravel are worn away by each vehicle mile of traffic over an ordinary gravel road.

The first value varies in this table from a minimum of 0 177 cubic yards to a maximum of 0 577 cubic yards However, the variation of the averages for the three separate sources is from a minimum of 0 241 to a maximum of 0 319 cubic yards per daily vehicle mile.

It is very interesting to note that the amount of gravel worn out and blown away under traffic is not nearly so great as is frequently mentioned in loose talk about road maintenance The most valuable part of these statistics perhaps is the fact that the amount of gravel lost is directly in proportion to the amount of traffic and there is

TABLE I

VINCENNES DISTRICT

Road	Section	Length in Miles	Cu Yds Gravel Used			Av Cu Yd Gravel per Mile per Year	Estimate of Daily Traffic	Cu Yds per Mi per Yr per Av Daily Vehicle	Cu Yds per Vehicle Mile
			1924	1925	1926				
20	A	14 0	3157	1024	2521	159	500	0 319	0 000874
20	B	14 3	3398	2078	2303	182	450	0 404	0 001110
20	C	6 7	1773	1219	1645	231	400	0 577	0 001580
18	A	12 6	1459	1373	2123	131	400	0 328	0 000900
12	B	14 3	5023	2809	3376	264	900	0 292	0 000800
12	C	15 3	5109	1831	3665	221	800	0 280	0 000769
5	A2	9 4	4606	1301	2994	316	1200	0 263	0 000720
5	C	14 6	7851	2331	4103	326	1000	0 326	0 000892
5	D	8 5	4891	1204	1064	281	900	0 312	0 000857
Above 9 Sections Combined		109 7	37267	15170	23794	232	728	0 319	0 00087

CRAWFORDSVILLE DISTRICT

33	C	7 99	3768	1926	4091	407	1600	0 254	0 00070
32	I	12 49	2602	3102	3786	253	1100	0 23	0 00063
54	N	13 75	742	3174	2213	149	550	0 27	0 00075
33	E	9 81	2698	3310	3358	318	1300	0 245	0 00067
29	D	9 07	764	1798	932	129	450	0 29	0 00078
31	F	8 62	1590	2797	Stone 965 Grav	207	800	0 26	0 00071
31	C	9 57	1582	488	2488	159	900	0 177	0 00048
Above 7 Sections Combined		71 30	13746	16595	17833	225	932	0 241	0 00066

SEYMOUR DISTRICT

4	Q	9 6	4045	2729	1733	267½	800	0 3344	0 000916
1	G1	10 2	5766	1925		377	1000	0 377	0 001033
1	H	10 6	6308	2172		400	1200	0 3333	0 0009132
1	I	10 3	4472 (1923)	1365 (1924)	(1925)	283	1400	0 202	0 0005534
12	K	7 1	1800 (1923)	1654 (1924)	3266 (1925)	315½	900	0 351	0 0009603
12	I	7 5	1878	874	2419	230	900	0 256	0 0007
Above 6 Sections Combined		55 3	24269	10719	7418	315	1017	0 308	0 00084

every indication from the study of the tables that the average of all the sections of road under study is a reasonable approximation

It is, of course, certainly true that the kind of traffic would affect these figures to some extent and also the kind and grading of the gravel Without having sufficient information on the amount of loss depending upon the hardness of gravel, it is safe to say here that so far as the study could be made, the increased loss due to soft gravel was not so great as was ordinarily supposed This perhaps may be due to the higher cementing value of the soft gravel which kept to a minimum the amount of loose material on the road surface

Table I gives the individual roads studied, listed under three separate groups as they were taken from three separate districts in the State of Indiana

V MAINTENANCE COSTS AS AFFECTED BY THE TYPE OF PAVEMENT AND AMOUNT OF TRAFFIC

The general belief that the higher types of pavement are the most economical in maintenance cost seems to be borne out by the maintenance records of the Pennsylvania Department of Highways during the last three years In connection with these figures, however, it is necessary to bear in mind that the durable types which show the lowest annual costs are of comparatively recent construction and their maintenance costs are likely to increase with their age In studying maintenance costs of various types, it is imperative that we keep in mind the fact that the maintenance costs are only a part of the total road costs We must also keep in mind that the various types do not furnish equal road service

The Committee has collected a considerable amount of data on this subject, but these data do not cover a sufficient mileage of roads to warrant our drawing conclusions as to types at this time The indications are that every type of road has a critical traffic point which is higher for high type roads than for low type roads When this traffic point is passed maintenance costs mount rapidly We hope to collect sufficient additional data in the coming year to enable us to report more fully on this subject in the next annual report