ENGINEERING

Successful "Dirt" Roads Now Made With Cement

New Method Promises Vast Improvement in Network Of Feeder Roads That Bring Farm Products to Market

MOTORING around the country, you soon may be riding on a "dirt" road made with cement. Already, in 29 different states, sections of this new type of road have been installed, using a method of construction which engineers thought impossible only a few years ago. But research has solved the problem, and now the dirt-cement mixture promises to be widely used on "feeder roads," over which the farmer reaches the main highway with his products.

These roads are by far the most numerous. Some 340,000 miles of main roads permit travel between all parts of the country. Carrying heavy traffic, they require substantial construction and this has justified an average cost of between $20,000 and $40,000 per mile. The feeder roads carry a much lighter burden of traffic, but they add up to about 2,660,000 miles.

Concrete, made by mixing portland cement with either gravel or crushed stone, sand and water, is the preferred material for the main roads, and even some of the more heavily used secondary ones. But a cost of $15,000 per mile or more is too much for the farm-to-market field.

About $5,000 per mile, highway engineers found, was the maximum that could be justified. Yet it cost about twice this figure even to haul in enough gravel or crushed stone to lay it on the road as a thin blanket. Mixing it with cement to make concrete ran up the cost still more.

With the cost of hauling in the material so great it was obvious that this could not be done, if the costs were to be kept down. And if no material could be brought in, only that available locally could be used.

"How about mixing the cement with the soil of the old roadway?" it was asked. Almost unanimous was the opinion that it could not be done. For years, specifications for making concrete had prohibited use of material containing more than 5% of dirt. Some engineers, and laymen, had tried to make concrete with earth, but these attempts had mostly been unsuccessful.

However, some experiments in South Carolina in 1933 and 1934 indicated that possibly, under some conditions, it might work. Under the direction of Frank T. Sheets, then director of the Development Department of the Portland Cement Association, and Miles D. Catton, a member of the department, studies were conducted.

When a soil-cement road is to be made, then, the first step is to take samples of the soil, and to test them. These tests show the proportions to be used, and then the construction gang begins work.

Beginning of actual construction is to "scarify" or scratch the old road to a depth of about six inches, with a rake-like device hauled by a tractor. Then the material is powdered, and this is best done with a disk harrow, like that used on many a farm.

Next, the predetermined amount of portland cement is spread evenly over the surface, and mixed with the powdered earth. Here again farm machinery plays its part. The disk harrows, heavy duty field cultivators, or gang plows serve admirably.

Now comes the adding of water. This is sprayed under pressure, and, of course, the amount must be carefully controlled. Once more the harrow, plow or cultivator goes to work to mix it all very thoroughly. Then the surface is packed down, graded and rolled, but still it is not quite ready for use. Too rapid drying is objectionable, so the road is covered either with straw or earth, which is kept damp for about a week. Then it is opened to traffic, though about a month is required before it "seasons." After that, if it should not be quite smooth enough, a thin asphalt layer can be applied to give the proper riding surface, though this is not necessary as a protection for the road.

The first road to be made this way, in Johnsonville, S. C., is still in good condition after exposure to five winters. In 29 states and Alaska, more than 300 miles have been constructed or contracted for since the first one was made.

Science News Letter, August 24, 1940

A Yellowstone National Park ranger and his wife have been adopted by four *skunks*—and by being careful not to step on the little friends or otherwise anger them, the household has got along very well, with the reward that there isn't a mouse on the place any more.

DISKING THE ROAD

Important implement in the new method of surfacing tributary roads is this familiar farm tool. It powders the soil, mixes it with cement, later on works in the water.