

Now for the constructive part of this criticism:—

Specifications should call for concrete of a certain strength. The strength called for should be varied to suit the various purposes to which the material will be put, and an appropriate factor of safety should be used in the design. Available materials in the locality of the proposed work should be sampled and tested by a competent engineer, and, in order to make use of the information, the designer should be informed, as early as possible, as to the strength available from these materials.

In almost any locality tests on 6 by 12-in. cylinders can easily be carried out. There usually is not time to do this after the contract is let, but some weeks are usually spent in preparing the layouts preliminary to the actual design of the work, and it is during this time that the proposed testing should be carried out.

Even if it be too late to carry out such tests, a contractor can succeed in making a concrete of any reasonable desired strength if the matter be left entirely in his hands. There is considerable information always available to enable him to accomplish the working out of the proper proportions, and he should be required to present his proposed proportions to the inspector sufficiently early to permit a careful checking of them.

Several years ago such a method as is herein suggested would have been open to several objections. These objections to-day are not well founded. The method of specifying concrete according to the strength, or any other quality desired, has not only become extremely practical, but is more advantageous from the standpoint of economy to all concerned.

PUBLICATIONS RECEIVED

SAND AND GRAVEL IN ONTARIO.—By A. Ledoux. Report to the Ontario Bureau of Mines, published by the King's Printer of Ontario, 138 pages and paper cover, 6½ by 9½ ins., illustrated. The report reviews the characteristic properties of sand and gravel and methods of testing, and deals with the origin and occurrence of fragmental rocks, and the distribution of sand and gravel in Ontario. The several counties have been arranged alphabetically and the location of every described deposit has been indicated by township, concession and lot. Deposits in more than forty different counties were visited during four months of field work. The author states that this report should be considered as only preliminary, as it is desirable to make a large number of tests of mortars and concretes made from the materials sampled, and also to secure further chemical analyses.

A new power project in Manitoba, known as the Winnipeg River Power Co., has been organized, and the \$7,000,000 plant proposed will require three years for completion. The site of the development will be Bonnet Falls, 75 miles north-east of Winnipeg. This plant will have an ultimate capacity of 168,000 h.p., in six units of 28,000 h.p. each. This will exceed the combined output at present of the municipal plant at Point du Bois and that of the railway company at Pinawa Channel.

The Dominion Bureau of Statistics, Ottawa, has just issued a directory of the chemical industries in Canada, listing the names, addresses and products of nearly 500 Canadian firms manufacturing chemicals or other products in which the processes used are essentially dependent upon the agency of chemical change.

The Dominion Iron & Steel Co., Ltd., Sydney, N.S., have accepted an amendment to their government contract for steel plate. The original contract was for 50,000 tons per year for a period of 5 years, at \$4.15 per hundred pounds. This has been modified by mutual agreement to \$3.65 per hundred pounds. This means a saving of approximately \$2,500,000 to the government. The company will now complete the erection of the new mill at an approximate cost of \$5,000,000.

THE COST OF A MILE OF ROAD*

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THE three diagrams herewith present the elemental facts pertaining to the cost of a mile of road. Fig. 1 shows transportation costs for motor vehicles for various grades and surfaces. Fig. 2 is based on facts as set forth in Fig. 1, to show the annual cost of a mile of road, including cost of maintenance, cost of traffic for varying costs per ton mile, and interest on the cost of construction. Fig. 3 shows the cost per ton mile, including the transportation cost per

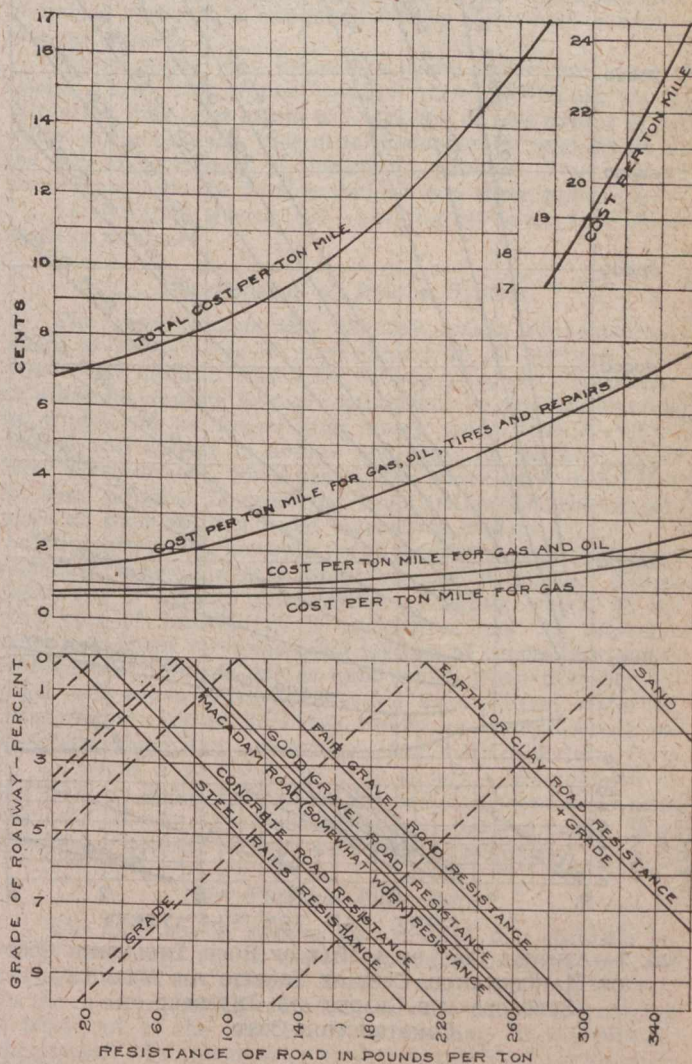


FIG. 1—TRANSPORTATION COSTS FOR MOTOR VEHICLES FOR VARIOUS GRADES AND SURFACES

ton mile paid by the user of the highway and the cost per ton mile of the highway itself, which is paid by the taxpayer in highway construction and maintenance.

All the highway authorities have been dealing with highway construction and maintenance almost solely in an effort to deal with this subject at the least possible cost on the part of the taxpayer, with little or no consideration for the cost of transportation.

The authorities agree that a 9-ft. gravel road is a satisfactory and economical highway for traffic not to exceed 200 vehicles per day, and that a 16-ft. gravel road is a satisfactory and economical highway for use of vehicles not to exceed 500 per day. Authorities differ concerning the automobile highway for traffic of from 500 to 1,000 vehicles per day, but the general opinion is that for this traffic some form of

*From a paper presented at an Engineering and Road Builders' Congress at Mineral Wells.