An average analysis of crude Venezuela asphalt was:

Bitumen	66	per cent.
Water	31	"
Mineral matter	1	"
Organic matter not bitumen	2	"
	100.00	per cent.

This asphalt is softer than that which comes from Trinidad.

A Cuban asphalt analysis reads:—

Pure bitumen	70	per cent.
Foreign matter	24.50	"
Water	5.50	"

This sample came from the mine known as "Angela Elmira," the same being situated about five miles from the town of Bejucal in the Province of Habana.

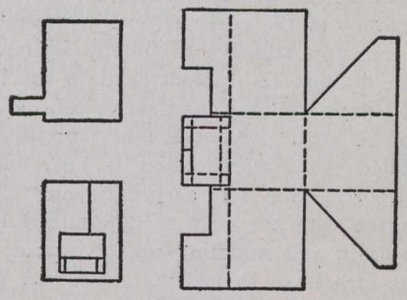

Fig. 3.

The following characteristics have been specified regarding mineral oils to be used as dust preventives or road preservatives:—

Specific gravity from 0.986—0.972 at 60°F.

Shall contain not less than 70 per cent. pure liquid asphaltum. Shall not contain over 2 per cent. water or foreign matter. Loss in weight on heating to 163°C. shall not be over 35 per cent.

Must be soluble in carbon disulphide to the extent of 98 per cent., and in 88° naphtha to at least 88 per cent.

STATISTICS OF THE LUMBER USED IN CANADA LAST YEAR.

Statistics of the lumber used during the past year have been received from 162 companies. consisting of the agricultural implement and vehicle manufacturers of Canada in six provinces, by the forestry branch of the department of the interior. 76,474 feet of lumber were used worth $2,513,265 or an average cost of $32.86 per thousand. Ontario used nearly 90 per cent. of the total for the Dominion. Quebec purchased 6 per cent.; Manitoba, 4 per cent., and Nova Scotia, New Brunswick and Prince Edward Island used very small amounts.

ANOTHER BIG RIVER IN CANADA.

The Porcupine river is a tributary of the Yukon. It has a tributary known as the Black Crow. Until a month or so ago no one believed that the Black Crow was more than twenty or thirty miles long. It is now known to be hundreds of miles long.

The discoverers are the surveyors delineating the international boundary in the far north. The last word received from them was that they had traversed 300 miles of the Black Crow. Access to the Arctic Ocean will be rendered much easier from the northern portion of Canadian territory.

DETERMINATION OF COST OF ALTERNATE PROPOSED DRAINAGE SYSTEMS.*

The installation of a drainage system and the fixing of its capacity is a matter of economics as well as engineering, for the homely question "Will it pay?" is the true criterion by which to judge the merit of any project.

It is especially desirable when planning for drainage to determine the proportionate costs of systems of different capacities in order to judge whether the drains should be built large enough to remove all rainfalls without being surcharged or whether expenses should be cut down by building them smaller and consequently apt to be flooded more or less frequently. Evidently the actual design of systems of different capacities in order to predict their cost would involve considerable labor and any method that will obviate the necessity of entering into the details of design will prove extremely helpful.

It is such a method that I intend to set forth; one whereby the cost of draining any district may be approximated without actually designing a system of drains. Naturally no account can be taken of any special peculiarities or difficulties of construction; neither is it my intention to enter into any discussion of the costs of various classes of drain construction, for that is too long a story, but it will be assumed that the costs of drains of various diameters under the average local conditions are known or that sufficient data to determine them are available.

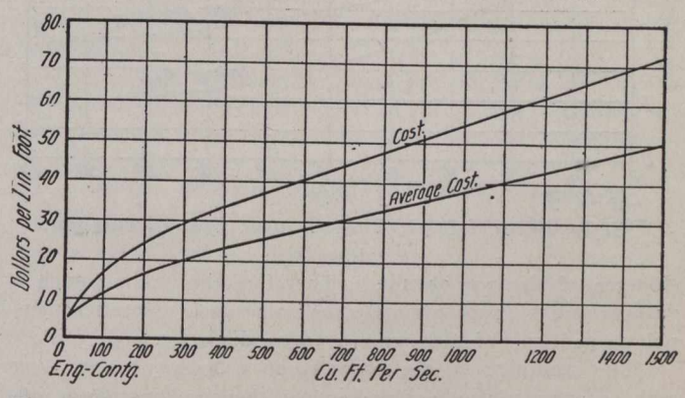

Fig. 1—Relation of Cost and Capacity of Concrete Storm Water Drain on Grade of 1 in 1000 in New York City.

The total cost of any drain may then be considered as a function on the length and diameter, but, as the diameter is dependent upon the grade of the drain and the required capacity the function really involves three variables: length, grade and capacity. The relations of two of these can be expressed quite simply; the cost will vary directly with the length and the capacity will vary inversely as the square root of the grade, but, the relation of cost to capacity is exceedingly complex. In the first place the cost is determined in no simple manner by the diameter and in the second the diameter determines the capacity in an extremely complex fashion, as those who are familiar with Kutter's formula know.

It is, therefore, hopeless to try to find any algebraic expression that will represent the dependency of cost upon capacity and a graphical method must be employed. This can easily be done by constructing a curve, the ordinates of which will be the cost per lineal foot of drains whose capacity on some one grade will be the corresponding abscissae.

*Abstract of article entitled "The Calculation of Runoff and the Cost of Drainage," by Carl H. Nordell, "Cornell Civil Engineer."