filing or polishing with an emery-belt, and the like. Unless this is done, it is found that the superimposed coating is likely to scale or flake off.

The thorough methods of cleaning by sand-blasting and pickling can be and sometimes are applied to structural and car steel for painting and for repainting, and undoubtedly are the best methods known for the purpose. They are, however, much more expensive than the ordinary method which consists in scraping, wire-brushing and wiping grease and oil spots with gasoline or benzine.

The sand-blasting method has the advantage over the pickling method in that it is more general of application, the pickling method being confined to the shop and generally to the material before assembling. It may, however, be of interest to know that good authorities maintain that iron or steel cleaned by pickling holds a coating more securely than that which is sand-blasted, and that this is owing to the rougher surface, viewed with a microscope, of the acid-etched metal.

The scraper and wire brush do not remove the firmly adhering mill scale, in consequence of which most of the structural and freight-car steel is painted over mill scale. It must be remembered that all platers and enamelers insist absolutely on the complete removal of mill scale; therefore it must not be regarded as harmless. It certainly is less dangerous than ordinary rust.

Builders of ships for service in sea waters have frequently required the pickling or sand-blasting of the steel parts which are to be submerged, in order to remove the mill scale, and it is the common practice to do likewise for steel passenger-car bodies. The removal of mill scale at the expense of incipient rusting is also sometimes attempted by the erection of steel structures without paint and allowing them to stand exposed to the weather for several months before painting.

In addition to cleanliness of surface, freedom from dampness, severe cold and frost is considered essential to the proper adhesion of paint. This may be accomplished by painting outdoors only in warm, dry weather, or by keeping the material under cover in warm, dry air during the process of cleaning and painting. Heating of surfaces is also resorted to.

While for some purposes, such as sea-going ships and passenger-car bodies, there seems to be little question as to the final economy of incurring the additional first cost of the more thorough methods of cleaning, the economy of such methods for ordinary steel structures and freight cars is not so certain.

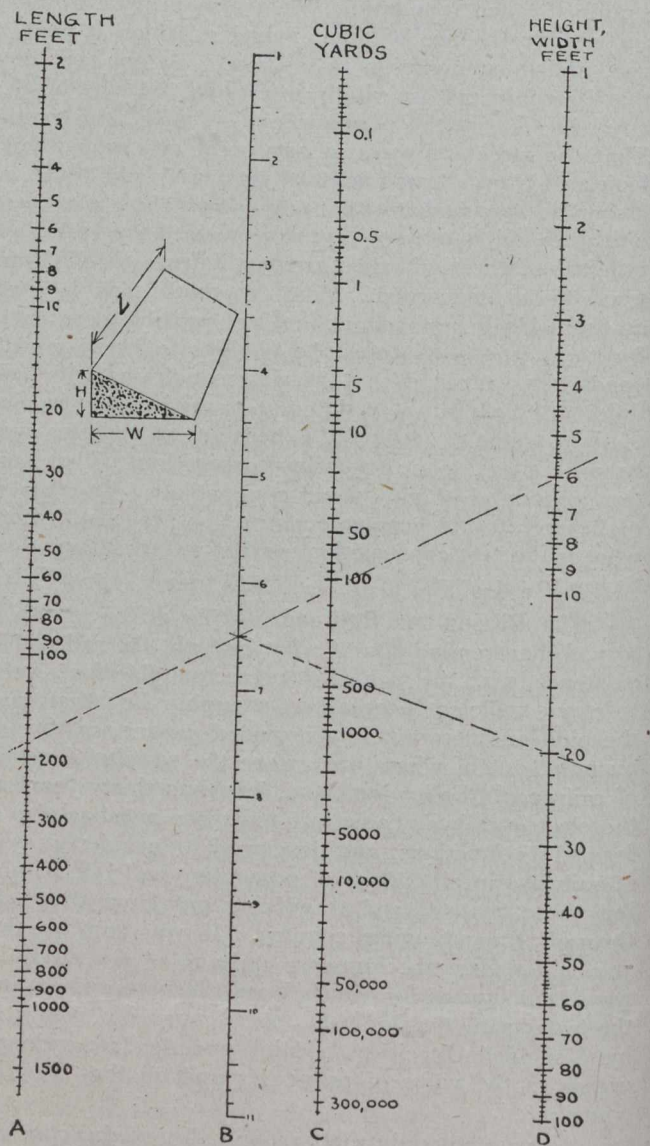
The sub-committee has considered the subject carefully at three meetings and recommends a series of panel tests to demonstrate, if possible, the relative merits of the different methods of preparing the surfaces and the effect of extremes of atmosphere and temperature conditions during painting. A programme for such a series of tests has been prepared.

Various recipes are given from time to time in architectural and building papers for the preparation of paint to be applied to cement and concrete surfaces. There is, however, nothing better than the zinc sulphate treatment. The surface is first washed with a solution of zinc sulphate in the proportions of 3 lb. to a gallon of water, and when dry can be painted with ordinary oil paint without danger of discoloration. The zinc sulphate changes the lime of the cement into calcium sulphate, while zinc oxide is deposited in the pores of the cement. As the two products of the chemical reaction are permanent and inert substances, familiar to plasterers and painters, they have no harmful effect upon either the surface or the paint subsequently applied.

HANDY EXCAVATION CHART.

THE accompanying chart will be found of value to those of our readers who are more particularly interested in engineering contracting work. The sketch drawn in the chart gives the idea of the section clearly.

For example: How many cubic yards in a triangular excavation where L = 180 feet (see column A); H = 6 feet (see column D) and W = 20 feet (see column D)?



Excavation Chart for Triangular Sections.

The dotted lines drawn across the chart show how it is done. First join the 180 and the 6 and find the intersection with column B. Then from that intersection point run over to the 20 and the intersection with column C gives the answer—400 cubic yards. It is unnecessary to do figuring; the chart does it all.

CANADIAN NORTHERN RAILWAY MILEAGE.

Among the interesting items included in the annual report of the Canadian Northern Railway Co., is the statement of mileage which totals 7,761 miles, distributed among the provinces and states as follows: Nova Scotia, 380.76; Quebec, 626.77; Ontario, 1,480.65; Manitoba, 1,983.46; Saskatchewan, 2,111.85; Alberta, 962.19; State of Minnesota, 215.42.