mine the physical properties of concrete and mortar containing various quantities of oil admixtures. These tests have demonstrated very definitely the value of oil-mixed concrete in damp-proof and waterproof structures. They have shown, according to recent report, that the admixture of oil is not detrimental to the tensile strength of mortar composed of 1 part cement and 3 parts sand when the oil added does not exceed 10 per cent. of the weight of the cement used. The compressive strength of mortar and of concrete suffers slightly with the addition of oil, although when not to exceed 10 per cent. of oil is added the decrease in strength is not serious. Concrete mixed with oil requires a period of time from 50 to 100 per cent. longer to set hard than does plain concrete, but the increase in strength is nearly as rapid in the oil-mixed material as in the plain concrete.

Concrete and mortar containing oil admixtures are almost perfectly non-absorbent of water. The addition of oil, however, does not appear to increase to any great extent the impermeability of concrete subjected to heavy water pressure, and this method alone will probably not make the concrete proof against the actual percolation of water through the mass. It has been found that strict attention to the details of proportioning, mixing, and placing concrete accomplishes more toward making it waterproof or impermeable than the addition of any extraneous material. On the other hand, no amount of care in connection with the preparation of concrete prevents the absorption of water into the mass. The addition of some water-repellent compound appears absolutely necessary to insure this result, and for this purpose laboratory tests have shown these oils to be at least equal to any other substance that has been used. Laboratory tests show that oil-mixed concrete is just as tough and stiff as plain concrete, and, furthermore, its elastic behavior within working limits of stress is identical with that of plain concrete.

The bond between concrete and plain-bar reinforcement is decreased by the use of oil in the concrete, but when deformed bars, wire mesh, or expanded metal is used there is no apparent decrease in the bond.

## OPENING FOR STEEL ROLLING MILL MACHINERY.

The Department of Trade and Commerce, Ottawa, advises that a firm in Buenos Aires desires to install, as soon as possible, the necessary machinery for steel rolling mills, to produce about 30,000 tons per year of double T from 0.080 to 0.300 N.P. and several other sections as angles, rounds, squares, flats, etc. Plans are therefore requested with details of trains of rolling mills and the corresponding auxiliaries, with all the improved means, up-to-date, to save time and manual labor, and besides a complete specification with weight and prices. Account must be taken of the fact that trains of three high rolling mills, the moving tables, guides and small rolls, travelling cranes and auxiliary motors shall move by electricity, produced by crude oil engines of the Diesel type or any other similar prime mover. It would be a fixed condition that, instead of a single oil motor, the power is to be divided in two or three oil motors, to help for repairs. There will be a three high blooming train to prepare steel ingots for two three high rolling mills. One three high rolling train will work from 0.80 cts. up to 0.22 cts., and shall have for it 30 rolls weighing 201.300 kilos. more or less.

The other three high rolling train shall laminate from 0.24 to 0.30 cts., and shall have for it 18 rolls weighing 125,000 kilos, more or less. Preference is expressed for only a single rolling train for all the profiles. The necessary rolls for angles, flats, rounds, etc., are to be taken into account. Besides the plans and specifications for the rolling mills, two travelling overhead electrical cranes are wanted for the steel foundry, and of 30 tons power each, with 15 metres span, and a third oil motor of 200 h.p. to give light for the workshop and power for pumps, tools, etc. Prices are requested for the total of the machinery, and separately, and the prices for the laminating rolls per piece or per kilos.

The name and address of the firm in question may be obtained on application to the Department.

## FACTORS GOVERNING SUCCESS IN WELL-DRILLING.

IN a paper read before the Connecticut Society of Civil Engineers by R. E. Horton, a hydraulic engineer, of Albany, N.Y., the subject of well-drilling is dealt with at considerable length. The author points out that a great deal of light can ordinarily be obtained in advance on the question whether a well at a given location will be successful or not. Still more certain answers to this question could be obtained if more effort were made by well-drillers, engineers and geologists to obtain accurate logs of the strata and materials passed through in drilling wells. The sand pumpings from an ordinary churn drill taken alone form a very unsatisfactory basis of determination of the character of the material passed through. In the first place, material from different beds is very often mixed; second, it all comes to the surface finely pulverized, and, especially in the case of sandstone or shale, it is sometimes impossible to tell from the drillings whether the natural material was in the form of earth or was cemented and consolidated into rock. The drillings from sandstone are frequently identical with those from sand, and those from shale are the same as those from clay containing shale fragments or gravel. Additional information can be obtained: First, from the rate of drilling; second, a well-driller can form judgment of the character of the material from the "feel" of the drill as the work is going on.

It is not always true that when the drill passes through material of a certain thickness, a bed of that thickness actually exists. Of course, if the bed happens to be inclined, its actual thickness may be very much less than the thickness drilled through. Whether or not the strata or beds penetrated by the drill are probably horizontal or inclined, and if so, about how much, can generally be determined from observations on the surface or in nearby railroad cuts or other deep excavations. This valuable source of information, always sought after by geologists, seems to be generally overlooked by well-drillers.

Other conditions affecting the probable success attainable by drillings are the presence or absence of faults in the locality, the presence of nonconformity in the strata, and in the case of materials other than firm rocks, the presence of local beds or pockets of impermeable material mixed in with materials capable of storing a water supply. Lenses of clay and pockets of nearly impervious conglomerate are both common in water-bearing beds of sand or sand and gravel.