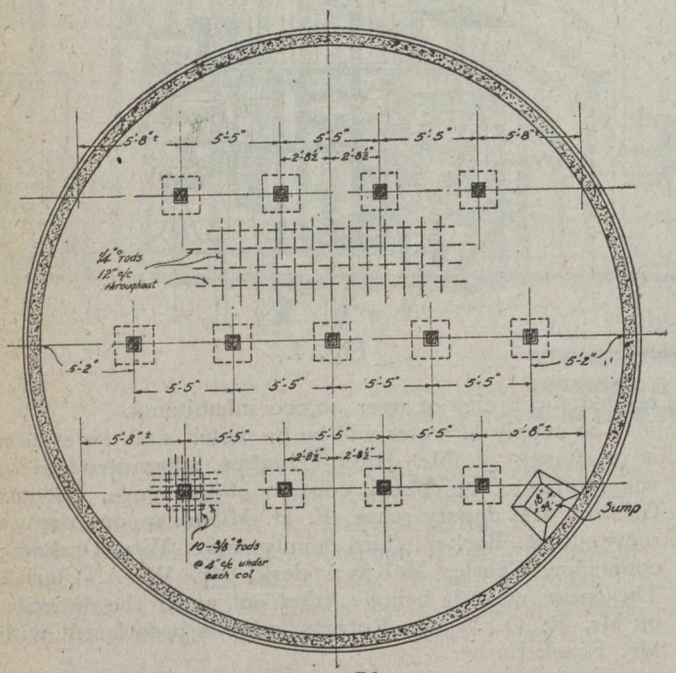
REINFORCED CONCRETE FUEL-OIL TANKS

THAT reinforced concrete, as a substitute for steel plates, readily accommodates itself to engineering design, is exemplified in the following description of a 40,000-gallon fuel-oil tank recently completed at St. Catharines, Ont. Underwriters' regulations, as they exist, compel the building of such tanks underground, and their design, therefore, includes certain features peculiar to themselves. The cylinder becomes a circular retaining wall, which, when empty, is subject to an external circular thrust only, and the roof is required to carry a permanent, distributed dead load of earth, besides a possible live load, such as a heavily-laden wagon or motor lorry. The tank in question has an earth covering of two and one-half feet, or two and one-half cubic feet per foot of area, which, at 100 pounds per cubic foot of material, say, makes a permanent dead load of 250 pounds per square foot, irrespective of any intermittent live load.



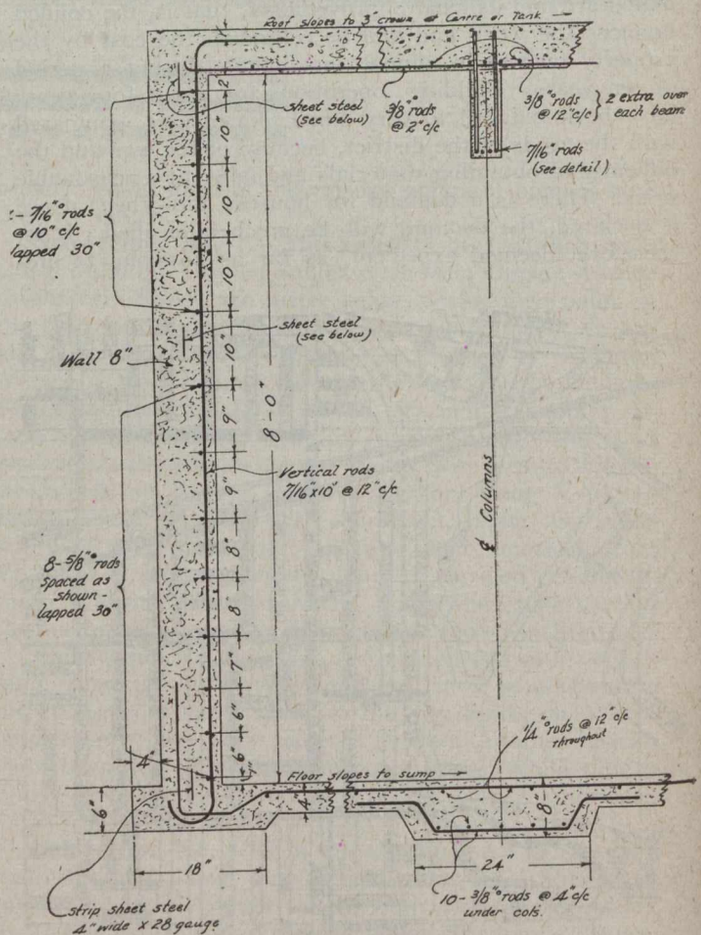
Floor Plan

Dimensions

The principal dimensions of the tank here illustrated are, internal diameter 32 feet and internal dep h 8 feet. The roof slab is provided with three ribs, or beams, 4 inches by 12 inches, which rest on columns, 6 inches by 6 inches. The floor is 4 inches thick, increased to 6 inches under the wall, and 8 inches under the columns; the wall is 8 inches and the roof slab 6 inches. The reinforcing was adapted to the material on hand, and, as there happened to be an adequate supply of ⅜-inch diameter rods on the premises, that size was largely adopted, otherwise a heavier rod might have been used, with spacing modified to suit.

Execution of Work

In order to reduce the cost of excavation to a minimum, the intention was to excavate a solid shaft of earth, the cross sectional area of which was covered only by the external circumference of the tank. By this method the face of the cut acts as the back form, and, as soon as complete, the tank would be already back-filled. If the material could have been relied upon to stand vertically upright (for a distance down of about twelve feet), long enough not only for the concrete to be poured, but also for it to set up, all well and good, but it is a method which does not readily accommodate itself either to rainy weather or to every kind of material. Some trouble was experienced in respect of both those points, though it was overcome by judicious handling. For the inside face of the tank steel forms were used, consisting of plates two and one-half feet wide, bent to the required radius, and stiffened by means of a bent rail. The wall was built up in rings, two and one-half feet wide, and a careful watch had to be kept to see that pieces of earth did not slip into the newly-poured concrete. Sheet steel strips, four inches wide, were inserted at intervals, or on completing a pour, the half of which was left projecting to help form a bond with the next batch. They served also to prevent any loose earth, which might have slipped into the concrete unobserved, from getting near the inner face of the wall. For the successful application of concrete to this class of work two conditions are essential. The concrete itself must be rich, and the whole worked up into a good, homogeneous conglomerate. Failure to observe either of these conditions results in leakage, as poor concrete is not oil-tight.



Section of Tank Wall

The design and execution of the tank herein described, together with a similar one now in course of construction, is the work of Mr. J. L. Weller, of St. Catharines, late engineer-in-charge of the Welland Ship Canal.

The annual meeting of the Engineering Institute of Canada for 1919 will be held in Ottawa.