

A REINFORCED CONCRETE STANDPIPE.

What is doubtless the largest reinforced concrete standpipe yet constructed is that built for the town of Attleborough, Mass., by the Aberthaw Construction Company, of Boston. Its erection was necessitated by the inadequate fire protection and the lack of water for domestic purposes provided by the then existing pumping station. Although Attleborough water is of the best, it contains so much carbon dioxide that the serviceability of iron tanks is of comparatively short duration. On this account bidders were allowed to present plans and specifications according to their own ideas of construction, each one specifying the amount of steel to be used, amount of concrete, and factor of safety, with complete plans and methods of construction, confining himself to the general design of foundation, standpipe, and gatehouse; the structure was to be guaranteed by the builders for one year from date of acceptance by the commissioners.

"After a careful study of all plans submitted and methods of construction proposed we considered," so says Superintendent George H. Snell in his report, "that the Aberthaw Construction Company's bid (\$34,000) was the one to accept, if any, for the following reasons: Extra steel reinforcement, richness of concrete, method of construction, and complete plans submitted.

"We had an estimate on a steel standpipe of the same size for \$37,135, making a difference of cost between that and the bid accepted of \$3,135.

"The advantages of a concrete steel standpipe over a steel standpipe are:—

"First. The cost would be \$3,135 less.

"Second. No cost of maintenance.

"Third. There seems to be no limit to the life of such a structure; or, in other words, is as nearly indestructible as a structure could be made.

"The maintenance of a steel standpipe of that size with our quality of water would be \$400 per annum if kept coated on the inside and painted on the outside, and the probable life only twenty years. It would also be necessary to empty the tank annually to clean out the rust and do the painting, which would probably take at least two weeks. During that time water would have to be supplied by indirect pumping, which means continuous expense of not less than \$100 per annum. You can see, by this comparison, that there was much in favor of the concrete steel standpipe over the steel standpipe. It seemed to us, in our judgment, it was far better to accept the concrete proposition."

The standpipe in question is 118 ft. high by 50 ft., inside diameter, with an adjoining gatehouse 18 x 18 x 16 ft. high. The walls are 18 inches thick at the ground level and 8 inches thick at the top. At a depth of 7 ft. was found a good, hard bottom on which to rest the concrete foundation. A reinforced fillet of generous proportions connects the walls and bottom pan. Extending entirely around the base of the tower is a reinforced concrete curbing 1 1/4 ft. thick by 3 ft., rounded at the top.

The concrete used was of the proportion one part cement, two parts sand and four parts crushed stone.

Horizontal reinforcement consists of round bars, varying in diameter from 1/4 inch to 1 1/2 inches. It was originally intended to use 5/8 inch twisted bars for vertical reinforcement, but as the difficulty of keeping the horizontal members in place was met with, channels were substituted, there being fifteen in number, equally spaced. These were drilled at intervals for the reception of short 1/2 inch bars upon which to rest the horizontal bars. This method of holding the latter members in place was all that could be desired. The horizontal bars were delivered in lengths of 56 1/2 ft.,

necessitating the use of three to span the circumference with an overlap of each of 30 inches with which to clamp them together. The bottom pan and fillet is reinforced by 1/4 inch bars spaced 6 inches, running at right angles to each other.

In the final design the horizontal steel reinforcement consisted of 1 1/2 inch plain round bars in double vertical rows extending from the ground to a height of 60 ft. Above this a single row was used, which at 81 ft. was reduced to 1 1/8 inches diameter. The steel is protected throughout by from 2 1/2 to 3 inches of concrete. The spacing of the double horizontal steel members varies from 3 3/4 inches, centre to centre, to 8 inches; that of the single 2 1/2 inch row 4 1/2 inches to 6 inches, and that of the 1 1/8 inches row 3 1/2 to 6 1/2 inches on centres.

In order to make the standpipe thoroughly tight, alternate coats of a solution of castile and alum were applied



to the interior, the first 33 ft. with eight and the remainder with four coats.

Circulation of water is insured by discharging into the standpipe through a pipe 40 ft. from the base and withdrawing through a 24 inch pipe at the bottom of the tank.

The top of the tower is covered by a Gustavino tile roof and ornamented by concrete pendants.

The Faculty of Applied Science of Manitoba University are holding their first annual examination. This year two departments were open, Civil and Electrical. These will be added to as occasion requires. The equipment of this Faculty has been improved by the gift of a reversable level from Cooke & Sons, also one from W. F. Stanley. E. R. Watts have presented a 5-inch transit; D. L. S. Pattern and Buff and Buff have presented an Avery testing machine.

A laboratory equipped for the testing of material will shortly be added to these departments.