REINFORCED CONCRETE STANDPIPES.*

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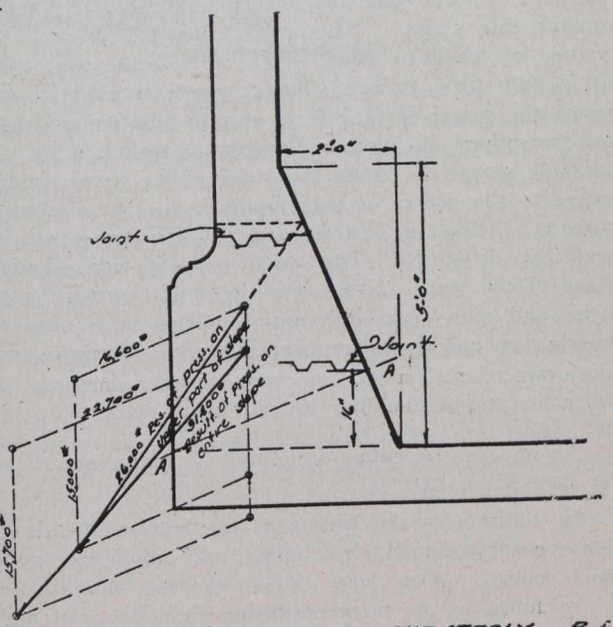
When a discussion of standpipes was first mentioned to me I asked the American Society of Civil Engineers to compile a list of all the reinforced concrete standpipes built in this country and abroad as found in print. I have received that list—which, by the way, was imperfect, as nine of the New England standpipes, and one in New South Wales, were omitted from it. It is interesting to know that the first one erected in this country was that at Little Falls, N.J., in 1899, although it is concealed from view inside the filter plant which it serves; and to date there have been 52 built in this country and abroad.

There are 13 New England tanks in this list, and no tank has been built outside of New England with a capacity larger than one-half million gallons; while inside there have been six of larger capacity, of which there are over one million gallons. This would indicate that local engineers and water companies have more faith in this type of construction than those in any other part of the world.

The company with which I am associated has built two large standpipes, and a tank, the smaller 40 ft. in diameter and 70 ft. high at Westerly, R.I., and the larger at Attleboro, Mass., 50 ft. in diameter and 100 ft. high to water level.



STANDPIPE AT WESTERLY, R.I.

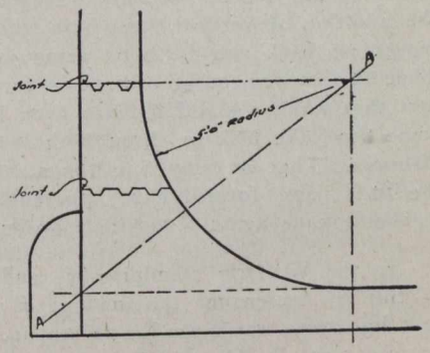
The Attleboro standpipe was designed on the basis that the hoops take the entire load with a unit stress in the steel of 13,500 lb. per sq. in. In order not to have the bars too close together, 1½-in. diameter bars were used in two rows from the bottom of the standpipe to a height of 61 ft. From 61 ft. to 81 ft. a single row of 1½-in. diameter bars used. From 81 ft. to 100 ft. the bars were 1⅜-in. diameter. In the upper 15 ft. of the height the section of steel was kept a constant, although the hoop stresses from the water were constantly diminishing to the top. This was done to provide for possible stresses caused by the formation of ice in the standpipe. In actual practice it was found that, owing to the frequent fluctuation of the surface of the water, ice did not form solidly over the whole water surface of the tank, so that pressure on walls never really occurred.

The walls of the standpipe started with a thickness of 18 in. at the bottom, and tapered to a thickness of 8 in. at the top.

In order to space the reinforcing bars the exact distance apart, 4-in. channels with a ⅜-in. hole through both flanges were used. The holes in these channels were punched so as to give the exact spacing required for the hoops. The channels were set upright at intervals of about 15 ft. centre to centre, a ¼-in. rod was passed through the holes, and the hoops were rested directly on the ends of these ¼-in. rods, which were then bent up to secure the hoop firmly. From the height of 61 ft. to the top of the standpipe where there was but a single row of hoops, 3-in. channels were used for spacers instead of the 4 in. The floor of the standpipe was 12 in. thick and met the wall with a curve whose radius was 5 ft.

The top surface of the floor was reinforced with ¼ in. square twisted bars 6 in. on centre each way. These bars were carried well up the curved corner, and into the wall of the standpipe; ⅝ in. square twisted bars were also placed radially at intervals of about 3 ft. around the circumference of the standpipe, their ends projecting up into the wall for a height of 10 ft.

The foundation consisted of a slab about 18 in. thick. Immediately under the walls of the standpipe, however, the depth of this slab was increased to 4 ft. for a width of 5 ft. A concrete curb 3 ft. high and 12 in. thick with a curved top



STANDPIPE AT ATTLEBORO, MASS.

was built around the outside of the standpipe at the bottom, but was not monolithic with it.

On one side a gate-house was erected enclosing the various valves and giving access through a passage covered by a balanced manhole cover to the interior of the standpipe.

The roof was a Gustavino tile dome in which were suitable means of ventilation.

At the high-water line a series of rectangular slots were left in the walls whose total area was greater than the area of the inlet pipe. These holes effectually prevented the water reaching a higher level than the one for which the standpipe was designed.

The method used in splicing the ends of the bars together may be of interest. These bars were obtained long enough so that three would reach entirely around the circumference with a lap of 40 diameters at each joint. Two

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