With these provisions, it is almost impossible to conceive of hydrostatic pressure developing to an extent to make it necessary to take it into consideration in the stress analyses. Under the worst possible conditions, with all the underdrains clogged, the hydrostatic uplift is limited to the bottom of the reservoir and the footing of the 24-inch wall, and even then the effect of it on the stability of the structure is negligible.

Architectural Treatment.—The city bought the property immediately adjacent to the reservoir to convert it into a park. To improve the appearance of the structure, the buttresses are widened out to three feet at the back, and between them a concrete curtain wall, four inches thick, is carried up for a distance of four feet above the finished grade. Between the tops of the buttresses, concrete arches are sprung. Each arch has a rise of three feet and a clear span of three feet less than the distance between the buttresses. The recess thus formed is filled at a depth of 12 inches with a thin curtain wall of stucco placed on hy-rib. At intervals of 5 ft. 7 ins., the hy-rib is supported by reinforced concrete beams. A concrete walk, 2 ft. 8 ins. wide, extends entirely around the reservoir. On the outside of the walk, a concrete railing in conformity with the architectural treatment of the reservoir is built. The false construction just described gives the reservoir a pleasing appearance of massiveness.

A driveway, 33 ft. 6 ins. over all, extends entirely around the reservoir.

Piping and Drains.—The water enters the reservoir through a 24-inch line. The outlet is located at the centre of the reservoir and is of the same size. Circulation is maintained by two check valves, one in the inlet and the other in the outlet, so arranged that the direction of the flow in these pipes cannot be reversed.

The overflow is located 18 inches below the top of the tank. The overflow pipe is 10 inches in diameter. A 10-inch cast iron pipe with its inlet in the lowest part of the spherical bottom and its outlet on the hillside, drains the reservoir.

Monolithic Construction.—Some question may be raised as to the economy of constructing a reservoir of the size described without expansion joints. The principal advantage that can be gained by monolithic construction is a general increase in strength. In a large structure, this increase in strength is by no means as great as a casual inspection leads one to believe. It is obtained only at a sacrifice. The stresses in the deck, when built continuous, are no longer static determinate quantities, and their amounts cannot be ascertained with any degree of accuracy. The stresses developed in the deck acting as a beam are also increased a more or less indeterminate amount by the expansion of the shell under pressure. For these reasons, comparatively low unit stresses must be used in designing the deck. The gain in strength due to continuity of deck construction, practically decreases as the square of the diameter in a structure of the type described. The increase in strength due to continuity of deck construction in large tanks is therefore very small.

Watertightness of the Structure.—Under ordinary conditions, the writer is opposed to the use of waterproofing ingredients or waterproofing applications, as both add considerably to the cost of concrete work. It is far better to put the value of the waterproofing materials into the concrete work itself by adding more cement. In general, the use of waterproofing ingredients or application tends to poor construction work, the contractor counting upon the waterproofing to materially help out careless construction.

The only waterproofing called for in the specifications under which the reservoir was constructed, was two coats of neat cement wash to be applied with a whitewash brush on the inside of the basin. The second coat must be applied before the first one has had time to get very hard.

Before the final acceptance of the work, the contractor is called upon to render the structure watertight if leakage develops in the basin in excess of five gallons per minute. The reservoir has been filled for a number of months to within ten feet of the top, and the leakage, as measured at the outlet of the underdrains, at no time has exceeded half a gallon per minute. No leakage whatever is visible on the outside of the shell.

Horizontal construction joints are used freely. The unfinished surface of these was always left in as rough a condition as possible, but was never roughened up after the concrete had partially set. The writer's experience has been that this roughening often loosens the stones in the partially set concrete, but not sufficiently so that the loose stones can be removed by brushes, a condition which is apt to impair the watertightness of the structure.

To start a day's work, the old concrete surface was thoroughly cleaned with wire brushes and water, and a semi-liquid mortar mixed in the same proportions as the mortar in the concrete was poured over the old work to a depth of half an inch. This method has given good, watertight horizontal construction joints.

Vertical construction joints were permitted only over the buttresses as such joints are very difficult to make watertight.

Cost of the Structure.—The following is an approximate estimate of the materials required for the structure, together with the contract unit prices:—

7,271 cu. yds. excavation, including grading, @ $0.55	$ 3,999.05
100 cu. yds. rock excavation @ $1.70	1,700.00
965 cu. yds. 1:2:4 concrete masonry @ $9.00	8,685.00
1,739 cu. yds. 1:3:6 concrete masonry @ $7	12,173.00
3,400 bbls. cement @ $1.50	5,100.00
189,900 lbs. steel reinforcement @ $0.0425	8,070.75
650 lin. ft. parapet wall @ $1.40	910.00
196 lin. ft. 24-in. cast iron pipe @ $5.40	1,058.40
215 lin. ft. 10-in. cast iron pipe @ $2.00	430.00
110 lin. ft. 3-in. cast iron pipe, drain, @ $0.50	55.00
12,300 lbs. cast iron specials @ $0.05	615.00
Two 24-in. check valves @ $200.00	400.00
One 24-in. gate valve @ $240.00	240.00
One 10-in. gate valve @ $25.00	25.00
880 lin. ft. 4-in tile-drain @ $0.12	105.00
160 lin. ft. 6-in. tile-drain @ $0.20	32.00
90 lin. ft. 12-in. vitrified pipe @ $0.70	63.00
One strainer 24-in. outlet pipe @ $7.50	7.50
630 lin. ft. 1-in. pipe railing @ $0.40	252.00
500 lbs. wrought iron @ $0.05	25.00
20,300 sq. ft. of stucco on hy-rib @ $0.15	3,045.00
Total contract price	$46,991.30

The reservoir was built on the summit of a hill about a mile from the nearest railroad station. All water used for concreting had to be carted up the hill, a distance of about a mile.

The final estimate exceeded the bid price by a very small percentage. The contractor's profit on the work approximated twenty per cent., indicating a reasonably economic reservoir, yet one which presents a very attractive appearance.