

Rolled steel joists were selected for the roof construction, as it would otherwise mean erecting false timber work to a height of 27 ft. to support the reinforced concrete beams. With the steel joists, however, the forms rested on the flanges, and this was a simpler and equally effective mode of construction.

The steel joists were elevated to the roof level by means of a fixed boom attached to the hoisting tower, which was used to raise the concrete and then landed on loose dollies and run within reach of a derrick. This placing derrick was built of 6-in. by 6-in. timber in the form of a double boom traveller, having a reach of 60 ft. when both booms were spread. It was slid along greased rails and carried a set of chain blocks at the end of each boom.

There are four cast iron ventilators in the roof.

Pipe Connections.—The 16-in. inlet and outlet pipes are placed diametrically opposite, and the overflow standpipe, and the scour outlet, which are together, are located half-way between the inlet and outlet. The overflow standpipe is held in place by 4-in. by $\frac{1}{2}$ -in. stays anchored into the wall.

All castings fixed in the concrete were uncoated and had puddle rings cast on, to prevent any water finding its way along the outside of the pipe. These rings are 6 ins. wide and 1 in. thick, strengthened by brackets 1 in. thick. All inside pipes have bell-mouths. The inlet and outlet pipes stand 6 ins. above the floor level.

All valves are located outside the reservoir, and enclosed in reinforced concrete manholes, measuring 3 ft. 6 ins. square at the top, and 3 ft. 6 ins. by 4 ft. 6 ins. at the valve level. The mains leading to and from the reservoir are of ample size to deliver at least five million gallons per day, and of such dimensions as to fit in with future extensions.

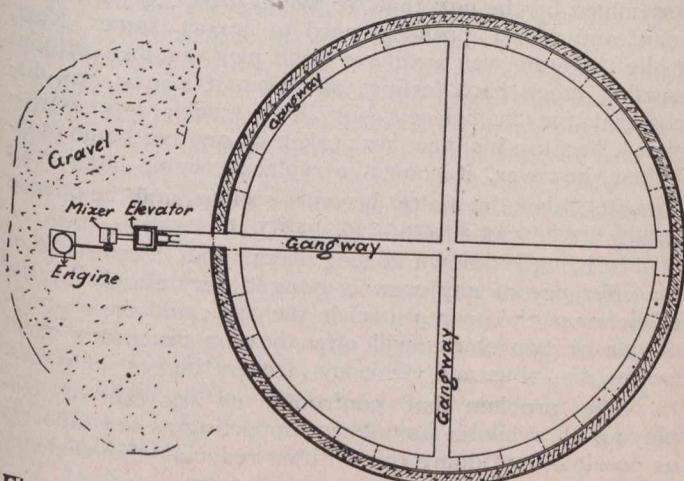


Fig. 6.—Arrangement for Mixing and Conveying Concrete

Wrought iron step ladders built of 4-in. by $\frac{1}{2}$ -in. stringers 18 ins. apart and $\frac{3}{4}$ in. rungs. The ladders are fixed into the concrete work at the top and bottom.

Reinforced concrete stairways are built at opposite points of the diameter to afford access. Stringers, 5 ft. apart, 15 ins. by 6 ins., and the treads are built monolithic and reinforced with half-inch rods lengthways and crossways.

Steel Reinforcements.—All bars or rods are medium steel, having an ultimate strength of 60,000 pounds per sq. in., and an elastic limit of not less than one-half of the ultimate strength, and elongate not less than 22 per cent.

in eight inches, and bend cold 180 degrees round a diameter equal to the thickness of the piece tested, without fracture on the outside of the bend.

Steel bars were joined together by overlaps equal to forty times their respective diameter and tied with black wire. The working stress on the steel was limited to 15,000 pounds per sq. in. tension.

Portland Cement.—All the cement had to comply with the specifications prepared by the Canadian Society of Civil Engineers as revised in 1911, and the methods of testing were as near as possible those referred to in such revised specifications.

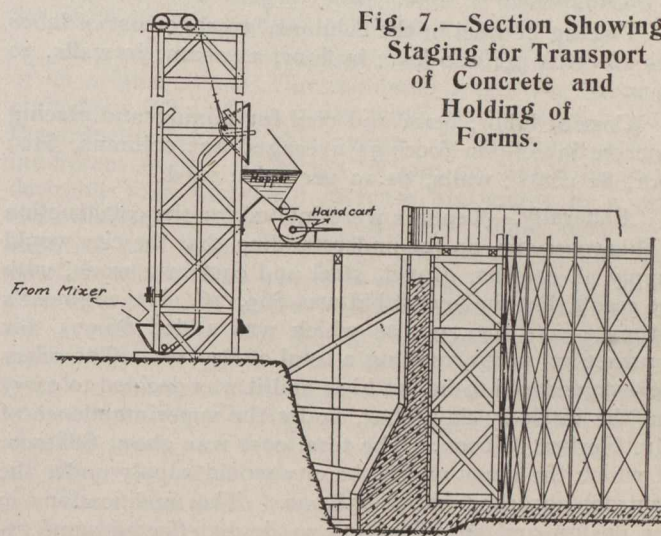


Fig. 7.—Section Showing Staging for Transport of Concrete and Holding of Forms.

Concrete.—The concrete was specified to be as follows: Floors, columns and wall, three parts of broken stone and gravel, one and one-half parts of sand and one part cement. The mass work round the pipes, in the valve chambers and in the roof cover were to be four, two and one, respectively.

The pit gravel obtained close-by, however, was found to conform fairly close to the specified proportions that a mixture of one cement to five pit gravel was substituted, care being taken to add more cement when necessary. About 3,400 cubic yards of concrete were laid. The limiting compressional stress in concrete was 500 pounds per square inch.

Mixing and Placing Concrete.—The concrete was mixed in a $\frac{3}{4}$ cubic yard Smith mixer, steam-driven. The concrete was mixed wet and was elevated by means of an Insley automatic roller hoist from the bottom into an Insley receiving hopper at the top, situated a few feet above the level of working operations from time to time. The concrete was then discharged into hand-drawn concrete hopper carts and wheeled over the gangways to all parts of the work. As the work proceeded the hoisting tower, gangways and forms were extended upwards.

Miscellaneous.—A Ham Baker water level indicator is being fixed to indicate the varying water level and by electric transmission to record the same at the Barton Pump House, half a mile distant.

A 20-in. by 10-in Simplex Venturi meter supplied by Messrs. Francis Hankin & Company, has been installed on the delivery main to the reservoir and near to the above pumping station. This meter automatically records the quantity of water pumped and also registers the total volume.

Supplies.—The $\frac{1}{2}$ in. and $\frac{3}{4}$ in. steel rods were supplied by the Provincial Steel Company, of Cobourg, Ont.; Other steel was supplied by the Western Steel and Supply