

level. After practically begging contractors to bid on this work, we finally induced Dunbar & Sullivan, of Detroit, to undertake the contract. Their tender for laying the two intake pipes, providing and placing the intake structure, and for placing 200 cu. yds. of one-man stone back in the excavation made for the structure, was \$34,000, and strange to say, this part of the work was completed in practically exact accordance with the plans without one single extra.

The length of each intake pipe is 272 ft., and the minimum covering over the pipes is about 3 ft.

The original plans called for building the intake structure on the shore, with concrete walls one foot thick, towing it into position and sinking it in the river, and then filling it with concrete from scows. But the largest derrick owned by Dunbar & Sullivan could lift only 25 tons; therefore, that firm asked us to revise the plans so that the weight of the structure built on shore would not exceed that amount. The accompanying illustrations show clearly how the forms were built and the manner in which the pipes were placed inside of the forms.

A 10 by 10-in. timber foundation was first built on shore to conform to the shape of the bottom of the structure. These timbers were well bolted together, and were covered



FIG. 6—CHUTING CONCRETE THROUGH 8-IN. PIPE TO INTAKE STRUCTURE 47 FT. BELOW WATER LEVEL

with 2-in. planks and then with 1-in. T. & G. boards. The forms were built nearly water-tight. One foot of concrete was placed on the timber foundation inside the form before it was lifted onto the scow. Concrete was also placed in the "nose" of the structure for a distance of 6 ft. back from the "nose." A 10-in. nipple was placed in the form at the point marked C on Fig. 2, and another at the point marked D on the same figure. These were capped. A flexible joint and one length of steel pipe was attached to the pipes from the inside of the structure, as shown in Fig. 4. Three lifting bolts, securely fastened into the concrete base, were also placed, as shown in the accompanying illustrations.

The river-bed excavation for this structure was made with a clam, and after very little trouble good progress was made. Fortunately, the work was in fairly hard material, and there was no difficulty with the excavation "filling up." The work had once to be abandoned on account of a heavy blow down the lake, but the excavation did not fill to any appreciable extent.

When measurements taken over the excavation showed that it was at the proper depth, and when the weather was favorable, the scow—with the structure on it and with the lengths of pipe attached as shown in Fig. 4—was towed into position and securely anchored in the river. The structure itself was lifted by a cable attached to one drum on the derrick, and the pipes by a cable attached to another drum, so perfect control was obtained.

The structure was lifted at 1 p.m., Monday, August 11th, 1919. It took so long to sink that thoughts of having to fill it with water flashed through the minds of the engineers.

However, by lowering very gently and giving it time to fill, everything proved to be entirely satisfactory. At 4 p.m. the structure was in its exact position, and measurements taken at various places showed it to be resting level and pointing correctly upstream.

The following morning an 8-in. pipe was placed in the lower hole, marked C on Fig. 2, the upper end of this pipe being at the side of the scow. At 11 a.m., 20 bags of neat cement, in the form of a thick grout, were poured into the 8-in. pipe. This 8-in. pipe rested on the concrete floor inside

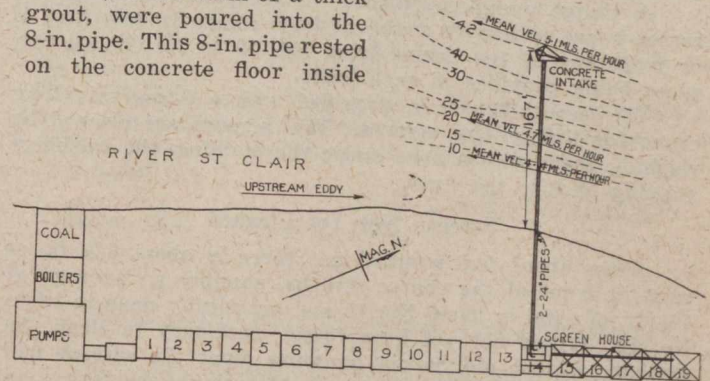


FIG. 7—PLAN OF INFILTRATION BASINS, BUILT IN 1914, SHOWING RECENT CHANGES AND NEW INTAKE

the structure. When the pipe was filled, it was lifted a little and the concrete slid into the structure. The concrete reached the top of hole C at 5 p.m. The diver then made his inspection and reported the crib full to within one foot of the form at that point. It took until 9 p.m. to have the pipe changed to hole D, and until 6 a.m., Wednesday morning, to fill the structure with concrete up to hole D. Later that same day, 200 cu. yds. of large stone were dumped in the river upstream from the structure; the clam lifted these and placed them around the structure to fill the excavation previously

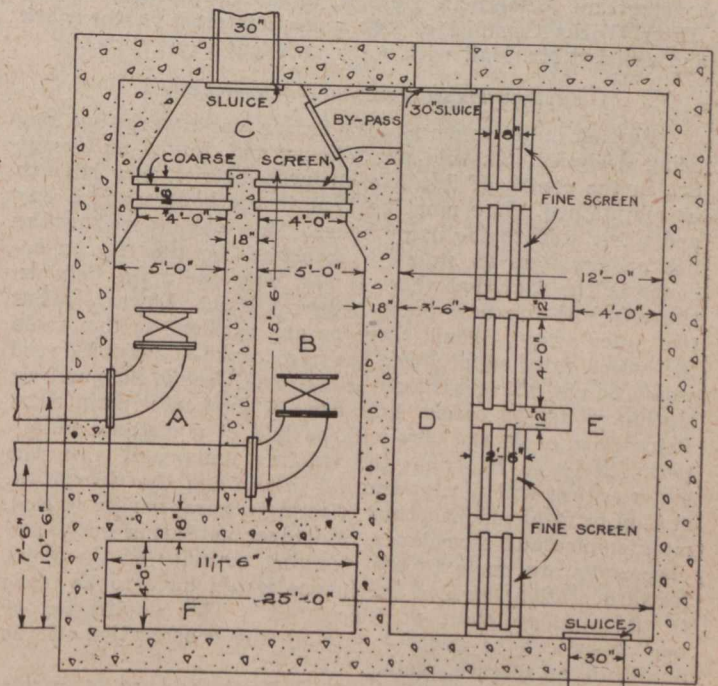


FIG. 8—PLAN OF BASIN No. 14

made. Excavation was then made for the intake pipes, and they were laid and connected to the intake structure without great trouble. The current at the bottom was so great that the diver had to be tied to a cable anchored in the river at one end and to the scow at the other.

All this work sailed along very smoothly. It was not because it was an easy job—indeed, it was a most difficult job—but Dunbar & Sullivan had studied their problem, and they went at it in an intelligent manner, the result being that the work was carried out with complete satisfaction