

construction, but as actually constructed, the foundations of the masonry aprons were extended into the body of the dock far enough to build this cross drain in concrete.

From the cross drain, a 6 foot square tunnel formed in the concrete foundations, runs beneath the south masonry abutment to the pump well below the engine pit.

This pump well is 23 feet 9 inches long by 6 feet deep and its roof is composed of a layer of concrete 10 feet 6 inches thick. In its centre is a 6 foot square pier to which run 12 inch I-beams from the side walls, as a support to the concrete roof and the machinery. Into this well extend the suction pipes from the centrifugal pumps.

Mechanical Equipment.

For the emptying of the dock there are provided three 36 inch, double section, centrifugal pumps, directly connected to simple, vertical, non-condensing engines. To take care of the leakage during use, an additional centrifugal pump, with 12 inch discharge, is connected to a small vertical simple engine. This machinery is located in a "pit" formed in the concrete which backs up the south abutment. The floor of this pit is 22 feet below the level of the top of the dock, or 15 feet 6 inches below mean low water line. From each of the large pumps, two 28 inch suction pipes pass vertically downward through the 10 feet 6 inches of concrete into the pump well below. There is one 42 inch, horizontal discharge pipe for each pump.

Steam is supplied from the boiler house at 125 lbs pressure. Three 350 H.P. Heine Safety Water Tube boilers, an auxiliary vertical boiler, two fire pumps, and fan and engine for forcing the draft, complete the equipment of the boiler house.

On actual test after completion, the average efficiency of each main pump was 38,250 gallons per minute. The indicated horsepower of the engines varied from 185 at starting to about 300 at the finish, giving an average efficiency for the pumps of 58%. The maximum efficiency noted at any time during the test was 72½%. These pumps and engines were built and installed by the Morris Machine Works of Baldwinsville, N.Y.

CONSTRUCTION.

General Scheme.

Broadly speaking the proposed plan of operation was as follows: After clearing off the existing structures and old wharves, to dredge away the material to the approximate lines of the dock bottom and side slopes; to drive the permanent protection work