

VERGENNES PUMPING STATION

Description of the Vermont City's Water Power Development—New Power House and Dam Built, and New Pumping Outfit Installed—Old Machinery Held as a Reserve Unit—Distribution System Practically a Closed One

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MUNICIPALITIES as well as individuals are often slow in developing, to a reasonable capacity, the water power rights which they have for years owned and disregarded. The case of the city of Vergennes, Vt., is perhaps typical of what a municipality can do in the way of proper development of its resources.

About thirty years ago the city of Vergennes installed a water turbine operating a power pump in a pump house half way down the creek falls. Of an available head of about 39 feet this original development made use, at a low efficiency, of about 17 feet. As the demand for water and leakage increased, this development of the water power proved inadequate during low water stages of the creek. Furthermore the old dam, across this branch of Otter Creek, leaked an amount of water which would be sufficient to furnish the deficiency in power during low water stages of the stream.

Made an Investigation of Layout

In 1913 the writer made an investigation of the layout and determined that there was sufficient power owned by the city for the installation of a complete hydro-electric development which would provide power for pumping, for a filtration plant, and for the lighting of the city and the sale of some power to its industries. This project was opposed by certain of the taxpayers and the whole matter was left in abeyance until 1917 when the dilapidated condition of the dam, the forebay and the pumping apparatus, required immediate action.

In figure 1 is shown the old timber crib dam, and the leakage at the heel of the dam, and the dilapidated condition of the structure as a whole is clearly indicated. The new work included the replacement of this dam with a concrete structure and the installation of new forebays for the city and the property owner on the other shore of this branch of the creek. The cost of the dam was divided between the city and the adjacent owner.

In connection with the construction of the dam a suitable



Fig. 1—Old Wood Crib Dam

forebay was also built for the adjacent owner to which he will make connection in due time for a new power plant. The new forebay for the city comprises a part of the new

plant which is now being used for pumping the water for the city.

New Power House Built

A new power house was built for the city on the rocks below the present structure as shown in figures 3 and 4.



Fig 2—Rear View Old Pump House, Showing Discharge of Old Turbine

This new location of the power house made it possible to obtain the benefit of the total available head. A new bulkhead was installed, replacing a wooden structure inside the old pump house, and to this bulkhead a new steel penstock carries the water to a new horizontal shaft steel case water turbine, with extended shaft for pulley. The penstock of the new unit consists of concrete and steel construction which delivers the water from the wheel to the lower level of the creek and gives it a direction parallel with the creek flow. The new power room was constructed of concrete walls and floors set on the natural rock bed. A considerable amount of rock excavation was involved to create a channel for the tail water from the old turbine which passes underneath the floor of the new pump room and discharges through the center arch of the new pump house.

The new pumping outfit consists of one 2-stage, centrifugal pump with a capacity of about 800 gallons per minute against a head of 250 feet with a speed of 1200 R. P. M. The power from the new water wheel is transmitted to the pump by a belt with about 20-foot shaft centers and with adjustable idler.

Old Wheel Reconnected to New Bulkhead

The penstock of the old wheel was reconnected to the new concrete bulkhead in the basement of the old power house and the old wheel was reset, repaired and put in as

good condition as was warranted in the case. The old displacement pump was also reset on steel I beams and re-aligned and anchored to prevent excessive vibration in bevel gears and in the pounding of the pump. The new forebay was extended to the rock and provides an additional depth of about 8 feet over the old wood box bulkhead and the suction pipe of the old pump was lowered to avoid the former troubles experienced with the former layout. A section of the new bulkhead was cut off by a partition wall and developed into a double screen chamber for the suction well of the new centrifugal pump.

The new work involved the remodeling of the interior of the old power house to accommodate the new work and a considerable expenditure was involved in removing an accumulation of old material, periodic repairs to bulkheads and additional columns and braces, which have been installed from time to time as the old structure depreciated.

Distributing a Practically Closed System

The distributing system of the city is practically a closed system, without storage and with relief provided only by an overflow into a water tank of the Rutland Railroad. The advantages of the centrifugal pump lie in the fact that for a given speed, which can be regulated by the gates of a

constructing the new pump room, which was directly in line with the flow of water. The island was also too small for convenient handling of the materials and labor and a great deal of the work was carried on with considerable inconvenience at a level of about 30 feet below the ground floor level of the old pump house.

The work was done on labor account through a construction committee appointed by the council, who worked with the engineer in executing the project.

North Jersey Water Commission to Purchase Land

As its second purchase in the Wanaque watershed of property to be used as the site for a reservoir, the North Jersey District Water Supply Commission has decided to purchase about forty acres, including water rights, from Colonel Edward L. Price, of Newark, N. J., for \$2,000. The land is located near Midvale. Recently the Kearny Town Council asked the commission if it would be able to purchase water from the Wanaque when developed. The commission ordered a reply sent advising Kearny, in making a contract for the purchase of water, to limit the period to five years, as it is expected the

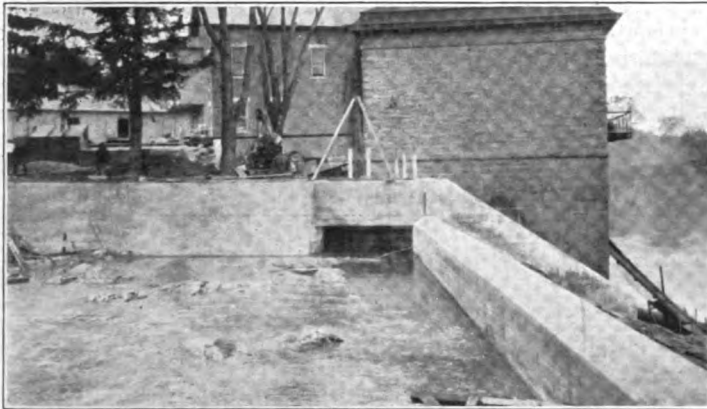


Fig. 3—New Dam and Forebay Completed as Cofferdam Above Was Being Removed

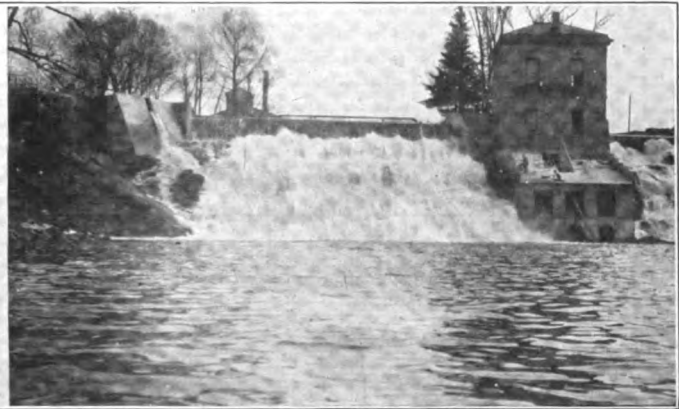


Fig. 4—Completed Dam and Forebays and New Pump Room Under Construction

water turbine, only a certain maximum pressure will obtain whether water is being used or not. For ordinary domestic service the water turbine gates are partially closed so that a uniform pressure of about 80 lbs. is maintained, while in case of fire, and as water is being used for fire purposes, the pressure can be increased by the simple regulation of the gates of the water wheel.

Old Machinery as Reserve Unit

For the dry season of the year and with the new construction, the new plant will have ample water for its maintenance, due to the increased efficiency of the new machinery, the increased head upon which it operates and the stoppage of leaks in the dam, forebay and bulkhead. The new outfit represents an installation which will conserve the old machinery for use as a reserve unit. With constant use the old machinery would not be safe, whereas with the repairs made upon it and with only occasional use, it will last for many years as a reserve and relay unit.

The total cost of the work, including the city share of the new dam, forebay, a new concrete wall around the island, owned by the city, all the new machinery and repairs, and reconstruction of the old pump house and installation of the new pump room, amounted to about \$16,000. The work was executed under rather trying hydraulic and physical conditions as the flows of Otter Creek are flashy and rapidly rise from a low level to one representing 2 foot head on 100 feet of waste weir. Much trouble was experienced with taking care of the water of the old water wheel, while

Wanaque will be developed in four years and that the town may then be able either to buy water from the commission or to join in the project by paying its pro rata share of the cost. In preparation for carrying on the defense to the suit brought against the commission and the city by the Lehigh Valley Railroad and the Morris Canal & Banking Co., the commission authorized the employment of an expert witness on water problems at a fee not to exceed \$100 a day and expenses. The engineer who will testify has not been selected yet. The next step in the litigation to prevent the development of the Wanaque watershed has been postponed until October by Vice Chancellor Foster, counsel for both sides having agreed to a delay. The suit was to have gone on the latter part of this month, but the questions at issue in the suit were of such importance that neither side had been able to get its case ready.

Convention of Indiana Sanitary and Water Supply Association

The annual convention of the Indiana Sanitary and Water Supply Association, of which Dr. W. F. King, Assistant Secretary, Indiana State Board of Health, is president, and Jay Craven, is secretary, was held in Indianapolis on April 9 and 10. There was a large attendance of water works men and sanitary engineers, and several papers of interest to the water and health services were read.