MUNICIPAL DEPARTMENT

FILTER BEDS CONSTRUCTION AT BEAVER LAKE, VICTORIA, B.C.

Mr. A. E. Wilmott, city engineer of Victoria, B. C., in a recent report, gives a brief description of the steps that have been taken to supply that city with filtered water. The results obtained have not been altogether satisfactory. It appears that in October, 1894, the city engineer was instructed by the Council to have a survey made, and submit a plan and estimate of cost of constructing a filter bed, having a daily capacity of three million gallons, for the supply of water to the city. From the information obtained, the engineer concluded that the best location for the filter beds would be on the solid ground a short distance below the outlet of Beaver Lake, and based his plans and calculations for the work accordingly.

On the 5th of December following the information asked for by the Council was ready. But as, at that time, an expert from Tacoma was introduced to report on the waterworks question, the city engineer was directed not to submit his report and estimate until the expert had reported. When the report of the latter was submitted, it was decided by the Council to call for competitive plans for the construction of the filter bed.

As a result, the location of the filter beds and reservoir were fixed in the bay near the outlet of the lake, and a contract let for their construction in July, 1895. After the principal part of the work had been constructed, including all the concrete walls, culverts, gate chambers, and the excavation for the reservoir, excepting a small quantity of the west side, the engineer, Mr. Jorgenson, who designed the works, and under whose direction they were being carried out, was removed, and the city engineer was authorized by the Council to supervise the carrying on of the work, the city taking the work of facing the slopes of the reservoir off the contractors' hands. In July following, the contractors claimed the works to be completed, but on account of the low stage of water in the lake there was no opportunity afforded of testing them until December, 1896. The ground having become saturated from the effect of heavy rains, a subsoil water leaked through, and under the west wall of the west filter bed, sufficiently to raise the water in that bed above the surface of the filtering sand, although at that time the water outside the main dam, between it and the cofferdam, stood below the level. There was also considerable leakage into the filter beds from the fact that the frames of the intake valves were not so connected with the wall as to be watertight. The contractors were notified to have the defects remedied, and after this was done another test was made. This test demonstrated that water still leaked from one filter bed into another, into the reservoir, and into the space outside the main dam.

The contractors declined to do anything further towards rectifying the existing defects, and it was decided by the Council that the corporation would proceed to do so, as far as practical, the expense to be paid out of the balance of the contract sum retained by the city, amounting to $25,000.

The filtering material was removed to permit of an examination being made of the floor and walls below the level of the sand surface It was ascertained that unfiltered water leaked directly through the main dam wall, also that the provision made for conducting water into each filter bed was by means of an unlined passage through the main dam wall, the material of the latter being of such a nature as to allow of the free circulation of unfiltered water all through the wall and into the filter beds. Other leakages were also discovered, and the floor of the filter bed was found to be cracked in some places. The city engineer reported that it was not reasonably practicable to make the works watertight when the main dam wall and the wall between the filter beds and reservoir were founded for a portion of their length on porous gravel, the foundations for the conduits and division walls constructed of dry masonry, and the walls themselves porous in many places. Under the circumstances he recommended the construction of a clay puddle embankment in front of the main dam wall, extending in height from hard bottom to about 2½ feet higher than the sand surface in the filter beds, all holes and cracks in the wall to be filled with cement and the face of the wall to receive two coats of neat cement, cast iron pipes to be placed through the main dam wall to convey water into the water beds in order to prevent it percolating throughout the porous concrete wall, all visible cracks and openings to be stopped with cement, the floor to be coated with concrete two inches minimum thickness, the walls to be faced for a height of five feet above the floor with cement rendering half an inch in thickness, the west wall to be faced with brick in cement nine inches thick, five feet high, to prevent subsoil water running into and distributing the filtering material.

Some of this work was carried out during 1897, and the whole of the reconstruction of the filter beds will shortly be completed. About $10,000 will yet have to be expended in completing the reservoir.

The work in the reservoir was greatly retarded and the expense increased in consequence of the flow of water from underneath the filter beds, which necessitated the continuous use of a steam pump to keep it down.

Regarding the work the city engineer says: "While of opinion that the course adopted by the Council in the matter of filter bed repairs is the best that under the circumstances could have been pursued, I take this opportunity to most emphatically disclaim any responsibility whatever as regards the success or otherwise of the works, having had no voice in the matter of their location or design."

"One fact," he says, "is pretty clearly demonstrated by these experimental filters, viz., that the fine vegetable matter contained in the water gradually retards the filtering capacity of the sand to a very appreciable extent, and would render necessary the frequent cleansing of the filter beds. If, as it is reasonable to suppose from existing circumstances, the water in Elk Lake contains much less vegetable matter than the Beaver Lake, the work to be performed by the filters would be greatly lessened, and the expense of cleansing the filter beds reduced, by drawing the water direct from Elk Lake. In the opinion of the writer the most economical method to adopt for that purpose would be to lay a submerged wooden stave pipe, say 30 inches in diameter, from the dam through Beaver Lake into Elk Lake, and construct a sand and gravel embankment across the upper end of Beaver Lake at its junction with Elk Lake. The material composing this embankment would be of such a nature that water percolating through it from Beaver Lake into Elk Lake would, to a certain extent, be filtered, and thereby diminish the work to be performed by the filter beds. By adopting this method the city would have the benefit of drawing water direct from a purer source without diminishing the available area of the watershed. In the event of this work being carried out, it would be necessary to provide against the the danger of damage to pipe from the effect of rising to the surface of those bodies of vegetation that form the floating islands."

The Waterous Engine Works Co., of Brantford, Ont., have made arrangements to build the Buffalo Pitts road roller for the Canadian trade.

Messrs. W. J. Elliott and J. A. Pennycuick, representing a company which have purchased the patents on a new process of manufacturing gas from garbage, recently gave an explanation of the process before members of the Toronto city council. It is claimed that sufficient energy can be obtained from the 50 tons of garbage daily deposited at the crematories to light between 1,200 and 1,500 arc lamps for 12 hours, and that the 40,000 loads of sweepings which are annually removed from the streets would give a large quantity of energy for manufacturing purposes. It would be necessary, they stated, to build a trunk sewer and erect works, when gas could be manufactured for fifteen or twenty cents per one thousand cubic feet. Between 10,000 and 15,000 cubic feet of gas could be generated from one ton of garbage.