MUNICIPAL DEPARTMENT

SUDBURY WATERWORKS.*

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In designing the Sudbury system we were handicapped in one particular; it was necessary to keep the expenditure down to the lowest possible notch, and give the ratepayers water. The corporation was enterprising but not wealthy, and the engineers, being residents, were fully aware that the "town fathers" were compelled to finance carefully as well as supply necessary demands, and were willing to co-operate with them and keep down expense, but not, however, with a "penny wise, pound foolish" motto, but only in such cases where the town would not materially suffer and where changes and extensions could be made in future with little additional expense. The principal clippings were: All ornamental designing, extensions of mains to outlying portions, extension of conduit, and filtration. Therefore, while not being able to present to the engineering profession a perfect system, we present, at least, *the foundation* for such, as well as fulfilling the requirements and meeting the wishes of even an enterprising and ambitious town.

The only available source of supply was Lake Ramsey, which is situated about three-quarters of a mile from the central part of town, and is 25 feet below the level of same, rendering a pumping system necessary. Lake Ramsey, which is so named *after the late W. A. Ramsey, chief engineer* of the C.P.R. construction, is 5 miles long and from one-half to one mile wide, and is fed by small streams and springs from its immediate vicinity, its position on the height of land separating the watershed of the Wahnapitae river from that of the Whitefish river, excluding it from being the receiver of any great extent of surface drainage, and while the water is not rated as first-class, there is nothing injurious or obnoxious in its constitutents.

The pumping station is built upon the shore of the lake, and consists of pump and boiler room 26 x 30 feet, electric light room 26 x 34 feet, with a 1½-story commodious dwelling above electric light part for the electrician and engineer. Just outside of station is built a well, into which the water from lake gravitates by means of 500 feet of steel conduit 11 inches in diameter. The walls of well are built from 18-inch brickwork at bottom to 9-inch at top, laid and lined with cement.

The intake at end of conduit is a steel funnel placed upright to pipe, with a perforated lid 30 inches in diameter.

About one-third of a mile from the lake and towards the town a rocky hill stands out as though Nature had placed it there purposely on which to erect the water tank. *The top of the hill is 100 feet above* the lake surface or 75 feet above the town. Upon this is built a steel tower 80 feet high, and supporting the steel water tank 24 feet in diameter and 24 feet high.

The tower, built by the Canadian Bridge & Iron Co., of Montreal, consists of six columns of 6-inch T iron, set on bases 3 feet square of cut stone from Longford quarries, set in cement and bolted to the solid rock below. These columns are braced by three sets of horizontal girders of same dimensions, and with wrought iron inch tie rods. The columns are placed with 50-foot spread at base, and converge to 25 feet at top.

Water is pumped into this elevated tank through a 10-inch main, and from thence gravitates through 10, 8, 6 and 4-inch mains throughout the system.

The pumping plant consists of two direct acting duplex Northey pumps, each guaranteed to pump at a safe and reliable fire speed 30,000 gallons per hour with *steam pressure of 80 lbs. per square inch.* These are connected to delivery main with proper valves, to allow single or double action.

The surface of water in well at low water mark is 9 feet below the pump valves.

The system comprises approximately:

500 feet steel conduit, 11 inches diameter
1,800 " 10-inch main
3,500 " 8-inch "
7,000 " 6-inch "
4,000 " 4-inch "
26 fire hydrants, with double hose connection and 14 valves.

The principal portion of mains in the town is connected in circuit, there being only two dead ends upon the entire system. The distributing main to town branches from the main leading to tower about 400 feet from same at foot of hill, thus enabling the tank to be shut off at any time by means of a gate valve and allow direct pressure from pumps over the system in case of repairs at any time to tank, or in case of large fires, but owing to the high pressure obtained from tower, the latter may never be required indeed, some householders grumbled that the pressure at tap was too great (a good fault), but to insure sufficient pressure at higher points within the town it was necessary to give 80 lbs. in the lowest portion. The water mains throughout are laid to give a 5-foot covering.

The upright pipe to tank was protected from frost as follows: A boxing of 2-inch plank 24 inches square was built over the 10-inch main, and the interior space around pipe thoroughly packed with mineral wool. A second boxing of 2-inch plank 36 inches square was placed over all, thus leaving an air space. The outer box was covered on all sides with a coating of hot coal tar.

Water tank was enclosed, both roof and sides, with inch lumber, tar paper, and *shingles coated with mineral paint outside* of studding, and dressed and matched lumber on inside. A space of 2 feet was allowed between the tank and covering, and a 3 foot walk outside with iron railing.

The connection of delivery pipe with tank is made with a special cast iron slip joint to relieve the strain caused by expansion or contraction due to the temperature.

SEWERS.

A system of separate sewers was included in the work for the thickly populated portion of the town.

Junction Creek, a stream 20 to 30 ft. wide, flowing as it does around the eastern and southern border of town, is the outlet for the disposal of sewage matter, and for the present population meets with the requirements, though in time the main sewer may need extending further down the stream before discharging.

This stream empties into Kelly Lake some two miles to the south-west of the town and situated further down the watershed than Lake Ramsey, the source of water supply.

The main sewer which extends along Lisgar street in a southerly direction to Junction Creek is of 18 inch extra hard salt glazed sewer pipe. The laterals extending east and west along the several cross streets are of 12, 10 and 9 inch pipe, as the case demands. The house laterals *are of 6 and 4 inch pipe.*

In laying the mains, junctions were placed every 50 feet (the width of lots), and these where present connections was not needed were plugged by means of a circular wooden cap sawn to fit, and cemented in. Extra precaution in all sewer joints was necessary owing to the nature of the soil, which was at that depth a "running sand" if at all wet, and would find its way through joints like water.

The greatest depth on main sewer was 20 feet, and this trench had to be timbered throughout *to prevent caving in.* The lower 4 feet of excavating had to be bucketed, shovelling being impracticable. All sewer trenching had to be tightly cribbed to enable safe and sure as well as speedy work. As a support or foundation for the pipe in main sewer two layers of 2-inch planking sawn in 3 foot lengths were laid angling across the bottom of trench, the upper layer angling in an opposite direction to that of the lower.

The depth at which this "running sand" is found varies according to the amount of rain fall. In a very wet season 3½ ft. is the maximum depth, while in a dry season one can dig 5 feet at the same place without fear of caving. When exposed to the drying elements this sand becomes quite hard and compact in a short time, but powders very finely.

Man-holes were built of brick and cement, with cast iron covers over main sewer at all junctions with street laterals, and also at upper ends of street laterals and bends. Through these the sewers are flushed by means of hose attached to hydrants.

On all house laterals a cesspool trap is placed at street line for the protection of mains, which has served as a good check, as shown in a few cases where inferior plumbing and careless occupants would ruin a sewer system if not protected by supervision or check as above.

In most cases a uniform grade of three inches per 100 feet was adhered to. The smallest grade which I had to resort to was 7 inches per 100 feet.

At outlet of main sewer there is quite a steep grade for 100 feet down the bank of creek, and the discharge is effected below the surface of the water. A solid retaining wall of brick and cement on face and rubble work behind is built around outlet for protection.

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