# WATER SUPPLY AND SEWER SYSTEM FOR CAP DE LA MADELEINE, QUEBEC

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DURING the past two or three years the village of Cap de la Madeleine, Quebec, has been favored with the establishment of several important industries, which has meant an increase in the population of the village of nearly 4,000 people. Up to the present time no water system had existed at all and the municipality was recently confronted with the necessity of going on with the work at a time when it was most difficult to secure money for that purpose. However, a franchise was granted to Mr. Alphonse Aubin to build such a plant, the company under agreement undertaking to construct the whole system at their own risk and expense, the municipality reserving for themselves the right of buying from the company within sixty days after its acceptance by the municipal council or at any time within five years.

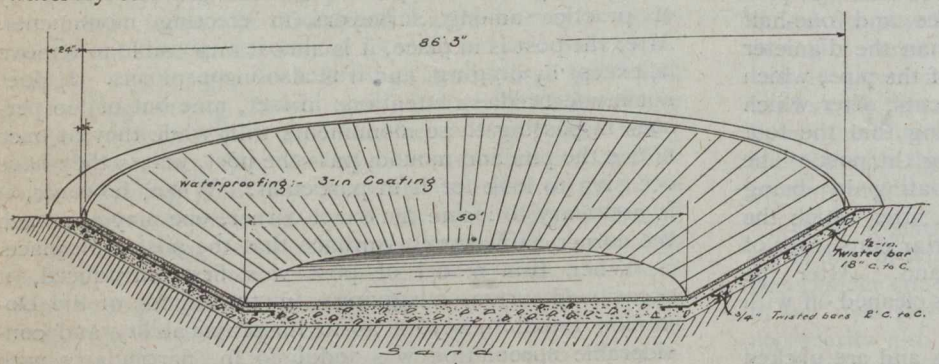


Fig. 1.—Section of Reservoir

If the municipality takes the plant over within sixty days, the specified price to be paid is the cost of the system of unit measurement. If, however, they do not exercise their option until after the sixty days have passed, but within the five years, the price to be paid is the capital represented by the revenue of the system at that time on a basis of 5 per cent. interest. The plant was designed by Mr. J. F. Greenan, of Chicoutimi, Que., who acted as engineer for the company, while the municipality engaged Mr. G. C. Bastien, of Three Rivers, to look after their interests.

A preliminary survey served to show that the geological conditions consisted of a stratum of sand on top of a stratum of blue clay. Borings were made with the following results: For two feet below the surface of the earth a stratum of gray sand exists; for the next ten feet, gravel; for the next two feet, fine sand; below this there is a deep stratum of blue clay.

It was decided to sink wells and pump the water from these wells into a water main, thence to a reservoir, the latter designed and placed so as to permit the return of the water by gravity. The water thus secured is soft, pure and cold, and is practically free from bacteria.

## Pumping Plant

The pumping plant consists of a building 18 ft. x 24 ft., one story high with concrete floors 12 ins. thick except under the pumps, where the thickness is increased to 15 ins. The pump house is designed to accommodate two centrifugal pumps, with a capacity of 450 gallons a minute under a head of 125 feet. These pumps are to be connected to electric motors. Only one of the pumps is now in place, but the other one is to be installed at an early date. The pump has a 6-inch suction pipe and the inlet pipe extends eastward for a distance of approximately 125 feet. This pipe may be lengthened if necessary. Every 10 feet, pipe wells were driven into the soil along the inlet pipe, centre to centre on one side and alternating 2 feet on the other side. Water is found at about 7 feet below the ground. The discharge pipe is also 6 inches in diameter and is attached by a "T" to a 10-inch main and to an 8-inch pipe which leads to the reservoir. The system of valves is controlled directly from the pumping station. By closing the valve in the 10-inch main, and the valve in the outlet pipe near the pump, and leaving the other open, the reservoir can be emptied for purposes of cleaning or repairs. If the pump should need repairs the valve in the outlet pipe is closed and the reservoir supplies the water by gravitation. The reservoir is situated on a hill, 60 feet above the pumping station and 80 feet above the lowest level of the system and 6,300 feet from the village.

## The Reservoir

The reservoir is of a circular type, having a diameter of 86 feet at the top and a diameter of 50 feet at the bottom, with a vertical height of 10 feet. The capacity is 235,000 gallons.

The sides and bottom are made of 1:2:4 concrete 24 inches thick covered by a 3-inch layer of waterproofing grout composed of the same preparation in the mixing of concrete as was used in the reservoir itself, to which was added 10% of Toch cement. Reinforcement in the sides consists of ½-inch steel bars on 18-inch centres, placed lengthwise, while twisted steel bars, 24 inches centre to centre, were placed circularly to the basin. No reinforcement was used in the bottom of the reservoir except with the side reinforcing extended 3 feet from the side. (See Fig. No. 1.)

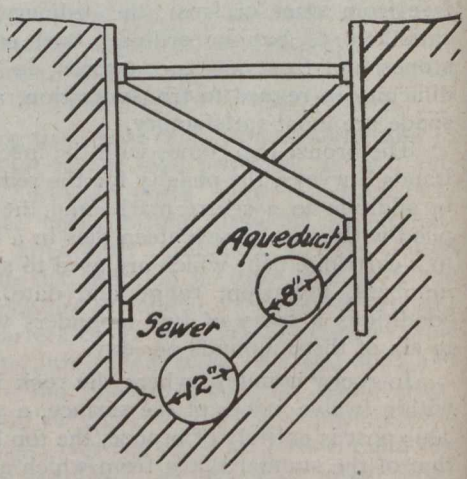


Fig. 2.—Showing Arrangement of Water and Sewer Pipes

## Pipe Laying

The construction involved the placing of 12,080 feet of 8-inch pipe, 16,540 feet of 6-inch pipe, 821 feet of 4-inch pipe, and 3,956 feet of 2-inch pipe, making a total distance of open trench of 33,400 feet. The contract for the trench digging was awarded to Messrs. John Bouvin, W. Binette & Co., Pronovost, at 25 cents per cubic yard. The average depth of the trench was 6 feet with a width of 2 feet 5 inches at the bottom. For the laying of the pipe the price was 8 cents per lineal foot; the pipe itself cost approximately $60 per ton and was supplied by Messrs. Therreault & Racine, Quebec.

About 20 pounds of lead were used for the joints, where the diameter was 8 inches; where the diameter was 6 inches, 15 pounds, and where the diameter was 4 inches, 10 pounds. Forty-six hydrants were placed along the system, the cost being about $75, while 45 valves were installed, costing approximately $40 each.