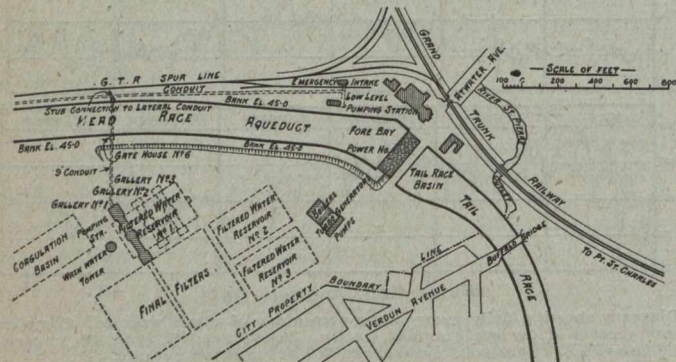


The headrace has a slope of 3.3 feet for the entire distance, and a bottom width of 163.85 feet. It runs partly in earth and partly in rock material. The bottom elevation at entrance is 21 feet above city datum. The water surface fluctuates from elevation 36 to 43.

The tailrace, which extends from the present water-works to the St. Lawrence River, opposite Nun's Island, has a total length of about 3,300 feet, a slope of 4 feet, and a bottom width of 113.85 feet. The tailrace excavation will be apparently entirely through earth material. Elevation of the bed at the outlet is 2 feet above city datum. The water surface fluctuates from elevation 8 to 20; flood level has been as high as elevation 28.0.

Both sides of the entrance canal, forebay and tailrace are lined with concrete retaining walls. No paving is provided for the earth sections of the head canal. Paving for the bottom of the tailrace is provided for in the present contract only for the basin below the power house, but we are informed that it is intended to pave the whole of the tailrace, and this paving will, therefore, be considered as part of the present scheme.

**Status of Present Work of Enlargement.**—The city engineer, in a report to the board of commissioners, dated December 16th, 1916, estimates the total cost of the work, when completed, at \$11,600,537.06 including cost of the work performed up to November 28th, 1916, covering all



**Scheme No. 1, Aqueduct Enlargement.**

Gallery No. 1, Filtration Plant as it is built. Gallery No. 2, proposed extension for 100 M. I. G. Gallery No. 3, proposed extension for 150 M. I. G.

contracts and expenditure since the beginning of the enlargements.

By deducting from the above the total amount of the cost of filtration works, the cost of a pump built in 1908-10 and interest thereon, not chargeable to cost of power development proper, the city engineer arrives at the following figures for the power scheme:—

Cost of work done to November 28th, 1916, including interest ..... \$4,013,510.12  
 Estimated cost of work yet to be done, including interest ..... 5,581,647.48

Total ..... \$9,595,157.60

The amount of interest included in the total is \$1,404,550.

The cost of abandoning the work has been estimated by Mr. Mercier as follows:—

Work done and interest ..... \$4,013,510.12  
 Work to be done, or payment to make:—  
 Bridges and fences ..... 300,000.00  
 10% on balance of Cook's contract ..... 203,640.00  
 Power house and building to use the 7,000 h.p. purchased ..... 340,000.00  
 Construction of another conduit or protection work ..... 1,000,000.00  
 Total ..... \$5,857,150.12

This is exclusive of large claims against the city in connection with this work, and which will require adjustment.

**Work Performed.**—The present condition of the work for the entire aqueduct is as follows:—

Earth excavation .....	About 50% done
Rock excavation .....	“ 90% “
Retaining wall, north side of entrance canal .....	48% “
Retaining wall, south side of entrance canal .....	20% “
Forebay and tailrace walls .....	Nil
Power house .....	“
Entrance gates, contract yet to be awarded .....	No work done
Supply conduit .....	100% done
Expropriations of land required for boulevards, etc. ....	Not completed

The result of our studies is presented under the following main headings, with such subdivisions of each subject as are necessary for a clear understanding:—

1. Method followed in carrying out the investigation.
2. Frazil.
3. Consumption of water by city.
4. Power actually used for pumping and lighting, and future requirements for pumping and lighting.
5. Definition of the term “horse-power.”
6. Project as designed; hydraulic data; velocities.
7. Amount to be spent if work is now abandoned.
8. Scheme No. 1, present scheme.
9. Scheme No. 2, maximum power available.
10. Scheme No. 3, minimum power available.
11. Scheme No. 4, pumping by steam.
12. Scheme No. 5, buying electric current.
13. Lighting.
14. Total cost and cost of operation of all schemes.
15. Financial statement.
16. Remarks on cost.
17. Recommendations.

**Method Followed in Carrying Out the Investigation.**

The needs of the city are as follows:—

Power for pumping water at Atwater Avenue, and electric current for water pumping stations such as McTavish Street and Papineau Avenue, sewage pumping stations, filtration works and street lighting.

There are three ways of obtaining the needed power:—

1. The establishment of a hydro power station at Atwater Avenue (Schemes 1, 2 and 3).
2. Pumping by steam and buying electric current for other needs (Scheme 4).
3. Buying electric current for all the needs of the city (Scheme 5).

A start has been made towards the carrying out of Scheme 1, and the adoption of either Scheme 4 or 5 would necessitate discontinuing the works now in course of execution. We, therefore, had to estimate the cost of making the canal fit for such services as may be required.

If the work be discontinued we have to consider two cases, A and B. In case A (Scheme 4 and 5) the banks of the canal, where walls have not been built, are simply trimmed to a natural slope, without any attempt to secure straight side lines or regular curves, cutting down the expenditure for this purpose as low as possible, leaving the tailrace in its present state.