

CITY ENGINEER'S REPORT.

CITY WORKS DEPARTMENT.

COMMITTEE ON WORKS 1911-1912.

JOSEPH A. CHISHOLM, Mayor, *Chairman.*
ALDERMAN ALFRED WHITMAN,
ALDERMAN GEORGE A. MACKENZIE.

OFFICIALS.

F. W. W. DOANE, M. Can. Soc. C. E., *City Engineer.*
H. W. JOHNSTON, M. N. S. Soc. E., *Assistant City Engineer.*
T. W. J. LYNCH, *Surveyor and Draughtsman,*
MISS HELEN M. DUSTAN, *Stenographer and Accountant.*

WATER WORKS.

EWEN MORRISON.....*Foreman,*
DANIEL J. McLEAN.....*Assistant Foreman,*
W. P. MORRISCEY.....*Plumbing Inspector,*
ARTHUR L. SMITH.....*Meter Foreman.*
JOHN E. BURNS.....*Chief Water and Meter Inspector,*
W. H. DANIELS.....*Service Foreman.*

STREETS, SEWERS, ETC.

JOHN McDONALD.....*Foreman,*
JAMES DOWNIE.....*Assistant Foreman.*

OFFICE.

JAMES J. HOPEWELL.....*Clerk of Works,*
MISS MINNIE HUNTER...*Stenographer and Assistant.*

City Engineer's Office, City Hall,

Halifax, May 1st, 1912.

To His Worship the Mayor:

Sir:—I have the honor to submit my twenty-first annual report respecting the public works of the City under the supervision of the City Works Department:—

Water Works.

Amount of funded debt on water account.....	\$1,183,441	00
“ transferred from revenue.....	51,000	00
“ of funded debt redeemed by sinking fund.	8,000	00
“ “ “ revenue....	30,000	00
“ “ “ premiums		
on loans... ..	4,073	33
		<u>\$1,276,514 33</u>
Amount expended to April 30, 1911.	\$1,254,051	50
Amt. expended in '11.	\$1,215,394	77
Amt. repaid in '11... ..	1,629	87
		<u>13,764 90</u>
Total cost of water works to date.....	1,267,816	40
Balance on hand.....	8,697	93
Amt. paid into Sinking Fund in excess of debt redeemed.....	52,571	00

Cost of Maintenance.

Interest.....	\$ 32,065	64
Sinking Fund.....	4,857	00
Maintenance of system.....	46,749	23
		<u>\$103,671 87</u>

or 8.18 per cent. of the total cost of the system to date, interest and sinking fund being 4.49 per cent; maintenance, including renewals 3.69 per cent. In addition to the above expenditure \$15,000.00 was transferred to construction account and \$15,000 to sinking fund from surplus revenue.

Renewals.

Street mains were renewed on Maynard, Falkland and Bauer Streets. The old four-inch main on Granville Street between Salter Street and Blowers Street was renewed with six-inch pipe and the six-inch pipe on Agricola Street between Bilby Street and Macara Street was taken up and nine-inch pipe laid to give the Merklesfield district direct connection with the twelve-inch main on Agricola Street. Three thousand five hundred and forty-nine feet of service pipe was renewed during the season.

Repairs.

ON	COST	Cost per mile of Mains.
Service.....	\$6504 92	\$84 74
Hydrants and valves...	2865 14	37 34
Leaks in mains.....	1041 76	13 57

New Work.

Distribution mains were laid for only seven extensions of the water service. Two were in the low service district and five in the high service, the total length of new extensions being 2714 feet. The total length of mains now in use is 76 3-4 miles.

Twelve new main stop valves and seven hydrant valves were added and two old valves were removed. The total number in use is nine hundred and seventy-six.

Two new hydrants were placed in service increasing the total to 467. Six old hydrants were replaced with improved City design frost jacket hydrants with steamer nozzle.

Three thousand three hundred and forty-three feet of pipe was laid for 92 new services. About three quarters of the new services were in the high system. The total number of service pipes laid is 7816.

Meters.

Two thousand eight hundred and three meters were installed during the year, the total number in service at the end of the year being 4161. The number of meters repaired was 556 or 13.3 per cent. of the total number in use. One hundred and seventy-five of these were repaired in the shop, the remainder 381 were repaired in service. Two hundred and eighty-one of the latter had the bottom broken by frost but were otherwise uninjured. The average cost of repairs was 33 3-5 cents per meter repaired or 4 1-2 cents per meter in use. The percent age of service pipes metered, is 53.

At a meeting held on May 18th, the Council by a vote of 12 to 3, decided to place a meter on every pipe in the high service district and on every new service pipe put in thereafter. Frantic efforts to alarm the public were made by men who either feared the financial result to themselves or sought to gain personal popularity by playing to the gallery. They alleged that meters were insanitary and created filthy conditions in the water, but failed to explain how the meters could put any dirt in the water if it was not there already. While the City Health Board satisfied itself that the public need have no apprehension, they decided to ask Dr. T. A. Starkey of McGill College to investigate and report. Dr. Starkey's report a copy of which is appended, removed all doubt which even the most timid might have, and the installation of the meters proceeded.

The Manager of the Nova Scotia Brewery also obtained an analysis of the low service water as follows:—

(COPY)

Certificate of Analysis.*New York, December 29th, 1911.*

The sample of water marked "City Water, used for brewing purposes," submitted by Messrs. A. Keith & Sons, Halifax, N. S., (The Nova Scotia Brewery) has been examined with the following results:—

	For every 100,000 parts.	
Total permanent hardness.....	0.10	parts
Free Ammonia.....	0.0008	"
Albumenoid ammonia.....	0.0001	"
Oxygen consuming power.....	1.10	"
Nitrites.....	none	
Nitrates.....	none	
Chlorine.....	0.70	"
Total solid residue at 127 C.....	3.80	"
Loss on ignition.....	2.40	"
Fixed mineral salts.....	1.40	"
Phosphates.....	none	
Iron or other metals in solution.....	none	
Reaction to litmus.....	neutral	
Biological conditions.....	sound	

This is a very soft water of great purity. It may be safely used for all purposes in and about the brewery, including the boilers. For mashing purposes, it ought to be hardened with pure soluble gypsum, in the proportion of 1 1-2 ounces per barrel of the total water used in the brewing. It can be added in the mash tun, after the malt has all run down.

THE NATIONAL BREWERS' ACADEMY AND CONSULTING BUREAU,
FRANCIS WYATT, *President.*

The first meter was placed in service July 4th, 1911 and when the public realized that at last the meters were to be put on, plumbers were at a premium; plumbing was overhauled, conditions improved rapidly and an enormous quantity of

formerly unsuspected waste was checked. At one house on Cunard Street, the waste for one month was registered 123,600 gallons.

By November 3rd, two thousand meters had been installed, resulting in a most decided improvement in the service

The average daily consumption during the month of October 1910, was 2,018,000 gallons. In October 1911 it had been reduced to 1,600,00 gallons.

The pressure at the hydrants increased as the waste decreased. Before the installation of meters, it was not an unusual occurrence to be unable to fill a watering cart at the hydrant at the corner of Almon Street and Windsor Street. At the first of November that hydrant carried a pressure of 26 pounds. At Windsor Street and North Street, the pressure had increased from 12 pounds to 33 pounds; at Agricola Street and North Street, from 11 pounds to 36 pounds. At the Nova Scotia hospital, the highest pressure reached formerly—65 pounds—was increased to 84 pounds and at Mr. Morrison's house, a former maximum of 54 pounds became 67 pounds.

During the winter in 1911 the Car Works could not get sufficient water for operating; the City Prison and scores of houses had no water at all, and there were hydrants where there was no pressure to even start the gauge, while the Superintendent's guage showed only 25 pounds. In the winter of 1912, the lowest reading at the Superintendent's gauge was 42 pounds; there was not a hydrant in the district with less than 15 pounds pressure, while the residents of Willow Park, some of whom had pumped water in the winter for sixteen years, had a good supply all winter. Never before have our meteorological records shown zero weather for a week continuously as in January 1912, yet the improved conditions were maintained.

The fire service also shared in the improvement. When the annual record of pressure on the hydrants in the high service district was made in March 1911, the average pressure

was only 26.30 pounds. In March 1912, it had increased to 39.45 pounds, an improvement of exactly 50 per cent.

A greater improvement is confidently expected when the whole service is metered. The consumption per capita per diem is now from 80 to 90 gallons. During a recent visit to Brockton and Lawrence, Mass., the officials of the Water Department informed me that meters had reduced the consumption in those cities to 36 and 43 gallons respectively. There is no good reason why Halifax cannot do the same.

Reservoir.

At a meeting of Council held on March 12, 1912, the following report from the City Engineer, recommending the construction of a reservoir and necessary alterations in the distribution system, was adopted and plans and specifications are being prepared for the work.

City Engineer's Office, February 21st, 1912.

High Service Reservoir.

His Wirship the Mayor:

Sir:—On the 18th of May, 1911, the City Council adopted my report on the high service water supply, dated March 7, 1911, which contained the following paragraph:

"I therefore recommend that meters be installed in the high service district, and further when the pressure has increased sufficiently to guarantee the filling of a reservoir by gravity, the necessary changes in the distribution be made and a reservoir be constructed at the most suitable location, capable of storing at least three days' supply. As Spruce Hill Lake is 116 feet above the highest point in the City, no pump is required to fill the reservoir if the waste is stopped. Nothing further is needed for domestic service, while every fire engine will be a pumping plant for fire service and the water will be there to pump."

At the meeting of November 9, 1911, a similar report was adopted, containing the following paragraph:

"As the pressure has already increased sufficiently to guarantee the filling of a reservoir by gravity, I would recommend that surveys be made to determine the best location for a reservoir, that plans be made for the necessary changes in the distribution and an estimate of cost with complete report be submitted to the Council at as early a date as possible."

Since the latter date, we have made careful studies for the purpose of deciding the best location for a reservoir. Three possible sites were investigated, namely Fort Needham, Rockhead and the summit of Shaffroth's Hill, popularly known as Hungry Hill.

The highest contour line on Fort Needham, shown on our plan is 225 feet above datum; on Rockhead the highest point is 235 feet, while Longard Road at the summit of Shaffroth's Hill, reaches a height of 247 feet above datum. This shows the summit of Shaffroth's Hill to be the highest land in the City.

If we were to construct a reservoir on the usual design, there would not be sufficient room on the summit of Shaffroth's Hill to accommodate it. On the other hand, Rockhead offers a very desirable site. There are two disadvantages in adopting the location on Rockhead, first, that it is not as high as the summit of Shaffroth's Hill and consequently there would be houses above the reservoir, and second, that the distance from the existing distribution system is greater and consequently the cost would be increased.

A reservoir to contain three days' supply was recommended in the first report, before our recent studies were commenced. I am of the opinion now, that it would be preferable to construct twin reservoirs on the summit of Shaffroth's Hill, building them of reinforced concrete or with earth retaining walls

as may be determined later. It would be advisable to construct one half only this year, but as the City grows, the population of the high service district increases and the consumption consequently becomes greater, the second half will be required.

The cost of one reservoir is estimated at \$40,000.00. Changes in the distribution would be necessary, although it would be unnecessary to carry out at once all changes which I am prepared to recommend. It would be advisable in the future to lay an encircling main 15" in diameter on Robie Street from Young to South Street; South Street from Robie to LeMarchant; LeMarchant from South to Coburg Road; Coburg Road from LeMarchant to Lilac Street—from Coburg Road to Quinpool Road via Lilac and Preston Streets; Young Street from Robie to Oxford; and Oxford from Young Street to Quinpool Road, taking up any existing pipe and replacing with the larger main.

While such distribution service is not necessary for domestic supply, it is needed for efficient fire service, and sufficient pipe should be purchased to enable us to do a portion of the work this year and other portions in following years.

The advantage of a reservoir would be that while in the long supply main from Spruce Hill Lake, the effective head from the elevation and consequently the pressure and discharge, is diminished, by the friction of the sides of the pipe and the various curves and bends, the reservoir would collect, close to the distribution of the City, a large quantity of water at a good elevation, the storage being accumulated during that portion of the day or night in which the draught is lightest. After the waste is all stopped, the greater flow would be at night. In case of accident to the main, such as that which occurred during the cleaning operations last year, the City would be supplied for a time, proportionate to the capacity of the reservoir, independent of the lakes. Not only would this supply be available in case of accident, but whenever the water has to be turned off from the main for cleaning, repairs or any other purpose, it would not be necessary to shut the water off from the City, as with a three days' supply in the reservoirs, the householders would never know that the water had been shut off from the main.

During ordinary times, the water accumulated in reservoir during the night or while the consumption is lightest during the day, is fed out again to the overworked mains during the times of highest consumption when the draught becomes too great for the capacity of the main supply pipe, keeping up the pressure, where under the old conditions, it dropped rapidly.

The greatest benefit in this connection would be the apparent during fires, as the draught during fires is a heavy tax on the capacity of the supply mains, but with the reservoir backing up the system, it would be impossible for hose streams or fire engines to reduce the pressure on the distribution so much as they do at present.

That the system in its present condition can keep such storage in a reservoir has been proved conclusively during the present winter. Never before have our meteorological records shown a week of zero weather continuously. That means that we have never recorded such a hard winter as we have had this year. Nevertheless, the pressure taken this morning on the fire hydrants on the highest points of the high service system, show a most satisfactory condition of the service. At the hydrant at the corner of Agricola and Cabot Streets, the farthest north on that street, there was 20 pounds pressure. At the hydrant on Longard Road at the corner of Columbus Street the farthest north on that street there was 16 pounds pressure. At night there would be considerably more, so that there is no question that the flow at night would fill the reservoir. At the corner of Windsor and Almon Streets, there was a pressure of 19 pounds, where during the summer it was frequently found impossible to draw water, the draught being into the main instead of flowing outwards.

I would recommend that legislation be obtained authorizing the expenditure of \$100,000.00 for water works purposes; that land be obtained for a site for twin reservoirs at the summit of Shaffroth's Hill, and that one half of the reservoir be constructed this year; that sufficient 20-inch, 15-inch and 12-inch and 9-inch pipe be obtained for the work that may be done within the next two seasons, and that during the season of 1912

an effort be made to lay a 20-inch and 15-inch main from the reservoir along Robie Street to Quinpool Road and a 15-inch pipe from Robie Street along Young to Oxford Street and that the extension of the 9-inch pipe through Almon Street and North Street between Windsor and Robie Streets be completed. Also that 12-inch pipe be laid in the west block of Bilby Street. This work will not cost the full amount for which it is recommended that authority to borrow be obtained, but it is estimated that it would cost this year the sum of \$80,000.00.

By the time this work is completed, it is expected that the high service will be in far better condition even than at present, as there are many cases of waste still being reported, one which came in today showing a waste in one month of 123,600 gallons—another showed 156,000 gallons in two months and a third, 289,600 in three months. We are overtaking these leaks as rapidly as possible, and a constant improvement is being observed.

The plan recommended, lends itself readily to the requirements of the future. By the time the population of the high service district has grown so large that a water supply of two million gallons a day is needed, it is safe to assume that the waste in the low service district will be stopped. It will then be possible to fill the reservoirs at night by pumping from the 27-inch main. The main pipe to and from the reservoir will pass the City Yard where doubtless the pumping plant would be installed.

Respectfully submitted,

F. W. W. DOANE, *City Engineer.*

Gate Houses.

Plans were prepared for new granite gate houses to replace the old wooden structure at Spruce Hill Lake and the north gate house at Chain Lake. The contract was awarded to E. Maxwell and the buildings are under construction.

Cleaning Mains.

The installation of meters made it unnecessary to clean the high service main three times as usual. A good supply was maintained during the Exhibition without cleaning immediately before, as we have been obliged to do for fifteen years.

The high service supply mains were cleaned on November 1st and the north end 12-inch distribution main on October 16th.

Meteorological Records.

The number of days on which precipitation was recorded was 173 and the total, 50.449 inches is 89 per cent. of the mean for the past forty-three years (56.523 inches).

In January, a cold snap lasted for six days, the minimum temperature being recorded as follows;

January 24th.....	4.6 F
25.....	2.2 below zero
26.....	6.7 "
27.....	6.0 "
28.....	1.2 "
29.....	0.0

Long Lake reached its lowest level on the 28th day of September, when the surface of the lake was 201.97 or 4.52 feet below the waste weir. Spruce Hill Lake rose to 364.09 on January 10th and fell to 360.28 or 3.06 feet below the waste weir on September 29th.

Fenerty vs. City.

In December Mr. E. L. Fenerty again gave notice of action for alleged wrongful withholding and diversion of the supply of water to which he is entitled, the special dates mentioned being May, June, July, August, September, October and November 1911.

The water let down to the "mill owners" has been measured through a wooden weir for many years. Last year the old weir was torn out and a concrete channel and measuring weir constructed. Mr. Johnston, Assistant City Engineer, gave the work his personal supervision, using every precaution to insure accuracy of construction and correctness of future measurement.

Forestry.

No one is in a more fortunate position to practice forestry than a Municipal Water Department. It has no taxes to pay, the time element, so detrimental to private ownership, is wanting, because a municipality has, in theory, at least, an everlasting existence, and the land which was bought as a protection for the water supply, from the forestry standpoint costs them nothing. Our water sheds have been denuded, and absolutely no thought has been given to replanting although it is generally understood that it is a disadvantage to have them bare. It is not so well understood, however, that municipal forestry can be made financially advantageous as well. Many water departments now have a municipal forest working plan outlined with regard not only to the purity and abundance of the water supply, but also to the economic value and the aesthetic standpoint.

A plan of systematic planting, cutting and trimming will in time restore a healthy forest cover to our watersheds, while the revenue from the sale of the wood which would be cut from time to time would provide funds for the planting of young seedlings and trees and also pay for other improvements, such as the introduction of roads and fire lines, which is an important item in modern forestry.

The Metropolitan Water Board, Mass., has planted some 1200 acres of land with pine and hardwoods at an average cost of \$20.00 an acre. In addition, in the first ten years they have had to spend \$6.00 per acre for improvement cutting, and about 25 cents per year for fire patrol. Expert foresters claim that

average land planted to pine will yield 46,500 feet per acre in 50 years, worth on the stump at present price \$465.00.

Balancing these figures:	Stumpage yields per acre
Cost of planting at \$20 for 50 years, interest	
4 per cent. compounded \$142.13.....	\$465 00
Improvement cuttings at \$6.00 for 40 years.	
interest 4 per cent. compounded, \$28.81..	
Fire patrol 25c. per year for 50 years, interest	
4 per cent. compounded, \$38.17.....	209 11
	<hr/>
	\$255 89

This leaves a net balance of \$256.00 profit per acre over and above 4 per cent. return on money invested, and this based on stumpage prices prevailing at the present time, and stumpage will certainly be worth no less fifty years hence.

If we pay expenses out of our buoyant revenue and take no account of interest, the net profit would be \$426.50 per acre or 92 per cent. Does it not seem reasonable to conclude that to allow 4000 or 5000 acres of watershed to lie waste and idle, holding it merely to prevent someone from living on it, and failing to develop it into forest, is a grave economic mistake?

Purity of Supply.

The City Engineer's report for 1908-9 contained the following:

"There is a possibility of contamination of the low service water supply from houses on the water shed, from the highway and from the railroad, although in most cases the possibility is more remote than in those which we have been watching. In the case of the Halifax and South Western Railway the line runs a short distance north of the upper and lower Chain Lake and crosses water courses which are dry in summer but which during and immediately after rains, carry the surface water to the lakes. When the line was under construction I used every effort to prevent contamination of the water in consequence of the number of men employed along the hill side above the lake. Now that the line is open there is still a remote possibility of

disease germs being dropped from a passing train and carried in the water courses already mentioned, to the lake. Typhoid fever is a water-born disease and while there is a possibility, no matter how remote, every precaution should be taken.

"In Beech Hill there are several instances in which the barn and privy are very close to the surface water course running directly to Long Lake, from which the City's water supply in the low service district is drawn through the Chain Lakes. If the City could afford it, there should be no residences allowed on the water shed."

The conditions mentioned were pointed out to Dr. Starkey and he endorsed the recommendations of the City Engineer. Immediate steps should be taken to prevent the use of closets while the trains are passing over the water shed and that portion of the water shed not yet acquired by the City, should be purchased without delay.

Streets.

The street mileage January 1st, 1911, was:

Streets open.....	463920 feet.....	87.86 miles
Streets not open.....	68370 feet.....	12.94 "
		100.80 "

The length of concrete sidewalks to date is 72034.29 feet equals 13.6 miles. The area laid in 1911 was 11700.09 square yards, length 13786.23 feet. Cost \$1.33 to \$1.91 per square yard. Included in the sidewalk work there was 3384 feet of straight granite curb, 580 feet of corner granite curb, 4518 feet of straight granite gutter and 589 feet of corner granite gutter laid at a total cost of from \$2.08 to \$2.39 per foot and 5746 feet of combined concrete curb and gutter which cost from \$0.57 to \$0.76 per foot.

A strip of land between the old east line of Upper Water Street and the official line was purchased from Burns & Kelleher for \$2000. That portion of land covered by the Forrestall

building (so called) on the south property was leased to Burns and Kelleher for \$36.00 a year, being 4 1-2 per cent on \$800.00 paid for it.

John Egan sold to the City a portion of his lots at the corner of Walnut Street and Watt Street for the sum of \$150.00. The corner of this land projected into the street, making traffic dangerous.

Mr. Silliker deeded to the City a strip of land required on the east side of Larch Street, for which the City exchanged a strip on the west side.

The City abandoned all claim to Payzant Street between Larch Street and Oxford Street and also to that portion of Lilac Street north of Payzant Street. In return for the latter concession, Mr. Gue deeded that portion of Preston Street to which he had a title.

The land required for the extension of Charles Street from Maynard Street to Gottingen Street was acquired and good progress made with the work.

At the April meeting of Council, the City Engineer's plan for the widening of Cunard Street was approved and expropriation proceedings were begun.

Section 11 of the official plan of the City was approved on the 11th day of May 1911.

Sewers.

Sewers were laid in seven streets only but some expensive work was included. The total length added as shown on the statement attached is 3233 feet and the average cost per foot, \$7.36. The high average is due to the Richmond outlet which cost \$12.86 per foot. Leaving this work out, the average cost was \$5.69 per foot.

The length of sewers constructed under the sewer act from 1890 to 1911 inclusive, is 152,548 feet or 28.9 miles.

Richmond Sewer System.

The most important work shown in the statement is the Richmond outlet through the yard of the I. R. C. This outlet located opposite the foot of Roome Street is designed to provide for the drainage of an area of about three hundred acres including all that district bounded by Richmond Street, Fort Needham, Young Street, Agricola Street, Cabot Street, Longard Street and the harbour. The outlet and a portion of the trunk sewer for the eastern half of the Merckelsfield district was constructed during the year. The outfall was concrete pipe 48 inches in diameter and was constructed across the railway yard under all the tracks without accident or interruption of train service. The outer 24 feet is cast iron pipe. The sewer crosses the inner end of the docks and discharges under water at the north end of the east dock in deep water. The old system of surface drainage was emptying into the inner docks.

The Railway Board consented to the location proposed by the City Engineer, provided that the work should be done under the supervision and to the satisfaction of an official of the railway; that the railway shall have the use of the sewer for its drainage, free of charge; that a watchman be put on during the construction of the sewer if required by the railway officials and to be paid for by the City.

The estimated cost of constructing the outfall and a sewer from the foot of Roome Street to the brook running out of Merckelsfield and the Hennessey Field at Gottingen Street was \$35,375.00. The work from Acadia Street to the dock has been completed for \$16,196.85.

The Coburg Road and Oxford Street Sewer.

This work is not shown on the statement because although the work on Coburg Road is completed (except the outfall) it is not yet in use as a sewer.

At the beginning of the season, very little progress had been made on the plans for an intercepting sewer along the Arm. The delay was caused by the necessity of utilizing all the time of the City Engineer's staff in an effort to overtake routine work.

In order to expedite the construction of the work and relieve the insanitary conditions which seriously menaced the householders, in the district, the Works Committee decided to make a start on the only part of the work on which they had a right of way, viz., on Coburg Road and Oxford Street. At the end of the civic year, the sewer on Coburg Road from Walnut Street to the Waegwoltic Club is completed and the construction on Oxford Street more than half finished. The action of the Works Committee will give the residents of the district adequate drainage facilities at least one year earlier than they would have received it if the committee had waited until the intercepting sewer could be constructed before beginning work on Coburg Road. Moreover the City Health Board had reported to the Council that "the neighbourhood had been waiting for the sewer and is suffering for the want of it—cess-pools are overflowing the sidewalk and some contagious sickness has already appeared in the locality. In the interest of public health the sewer should be completed without delay."

Catchpits, Drains, etc.

Forty concrete catchpits were constructed making the total 973. Five existing pits were abandoned and filled in.

One hundred and fifty-five permits were issued for laying cleaning or repairing drains.

The Plumbing Inspector reports approval of 502 applications for permission to do plumbing work, an increase of 45, and 463 certificates were issued for completion of work.

The Board of Plumbing Examiners held seven meetings, eight candidates were examined, five of whom passed and three received permission to work for one year pending further examination.

Webster Suit.

Mr. George C. Webster brought an action against the City for damages alleged to have been caused at his properties 69-73 Agricola Street by a stoppage in the sewer.

The report of the City Solicitor and the judgment of Mr. Justice Drysdale follow. Both are favourable to the City.

Office of City Solicitor, March 7th, 1911.

His Worship the Mayor, Chairman Committee on Works:

Sir:—I have already given my opinion that the City is not liable in the matter unless for negligence. I have since, in conjunction with Mr. Doane, made a careful investigation of the question whether or not there was negligence on the part of the City.

The stoppage which occasioned the overflow took place in the Agricola Street sewer between William Street and West Street. Mr. Webster's property is situated on the east side of Agricola Street near William Street. The sewer has been constructed for some time, but is properly constructed and in good repair, and there is ample fall in that locality. Immediately after Mr. Webster complained, Quirk, an experienced man who has been thirty years engaged in sewer work for the City, was sent to make an investigation. He found that the sewer was completely choked a short distance below Mr. Webster's properties, causing the overflow complained of. On opening the sewer it was found that the cause of the stoppage was that a piece of wood, apparently part of a barrel stave, had become jammed across the sewer, against which mud and other refuse had accumulated to the extent of about two cart-loads, completely preventing the passage of any water. Such a stoppage is of frequent occurrence without any negligence whatever, and there is no apparent way of preventing it. Sticks will find their way through the gratings or other openings into the sewers. Frequently they are put through the gratings by mischievous boys. Once in the sewer they may

travel a long distance without finding a lodgment. It is absolutely impossible to tell where a similar stoppage will take place. They are of frequent occurrence and if the City was to pay all the claims arising out of such stoppages, it would be involved in very serious liability without any means of preventing it. In this case, however a stoppage of some sort occurred in the same locality about a year ago, and Mr. Webster's claim is based on the fact that the occurrence of this stoppage was notice to the City that some defect in the sewer existed at this point which should have been remedied. Prima facie, this contention is reasonable, and I have directed my investigation mainly to ascertaining whether a well founded claim of negligence can be asserted in respect to it. The facts appear to be these:—A stoppage in about the same locality took place a year ago. As soon as it was reported, Mr. Downie, one of the City's foremen, went to the place and opened a hydrant at some distance above the stoppage, and found that the full discharge of the hydrant flowed without any apparent obstruction, down to the man-hole at West Street, which it could not have done if any such obstruction as was recently found had then existed. Both Mr. Doane and Mr. Quirk inform me that dams in the sewers frequently form, sufficient to cause a stoppage and overflow, and then break up of their own accord, and this appears to have been the cause of the stoppage a year ago. If the stick which caused the last stoppage had then been jammed in the sewer, the water would not, in all probability, have flowed through as freely as it did on the investigation by Downie, and certainly if the stick had been there, a year could not have elapsed without the formation of a dam which would have completely choked the sewer long before the last stoppage. The investigation made by Downie, was, I am informed, as complete as usual, and in fact as complete as it is possible to make it. The only thing that could have been done further, was to tear up the entire length of the street without knowing whether any obstruction existed or not, and if this should have been done in this case it would practically involve the necessity of destroying the sewer in every case where an obstruction took place to make what in all probability would prove a useless enquiry.

For these reasons I am therefore of opinion, in which Mr. Doane agrees, that there is no evidence of which we are at present aware, on which a charge of negligence against the City could be properly predicted.

F. H. BELL, *City Solicitor.*

Webster vs. City of Halifax.

The Plaintiff is the owner of four houses on Agricola Street which he lets to tenants, and the complaint in this Action is that damage resulted to Plaintiff by reason of the sewer on Agricola Street choking and backing up water into the cellars of these properties on 27th November, 1910. The sewers are under the charge and care of the City. I find the Agricola Street sewer to be one of proper construction and reasonably fit for the drainage of the district, and if any action lies here it must be based on negligence on the part of the City in the care of the sewer. The Plaintiff complains that on Thanksgiving Day, 1909, there was a block in or choking of such main sewer that caused the flooding of all these properties; that he then notified the City Engineer thereof and that such officer in his inspection and examination of conditions existing at that time was negligent in that an obstruction existing then was allowed to remain in the sewer at a point below Plaintiff's properties which ultimately caused a complete stoppage of the sewer and damage to Plaintiff on November 27th, 1910. Plaintiff did not own two of the properties in 1909, but became the owner of 67 and 69 by purchase in August, 1910. As to these two of course he has nothing to say by way of any claim for damage before his purchase, but he alleges that all four were flooded in the fall of 1909, that the City Engineer or City authorities did not remedy the cause of the flooding then existing and were negligent in their work of examination, with the result that on November 10th all four houses were flooded, whilst he was owner, and that damage resulted. The Plaintiff contends and says that after the examination by the City Officers in the fall of 1909, and between that time and 27th November, 1910, water again appeared in the cellars, but the evidence is not very definite about this, and it is to be noted that no complaint

was ever made of such alleged flooding to the City. On November 27th, 1910, undoubtedly the sewer became blocked and a flooding of the cellars occurred, and on this being reported to the City an investigation was made, the sewer found choked by refuse and the matter promptly remedied. I think whether the City officers are to be found guilty of negligence or not must depend upon their conduct after the obstruction on Thanksgiving 1909 of which they received notice. At that time it would have been reasonably clear there had occurred a stoppage that caused the flooding of the properties then owned by Plaintiff, viz—No. 71 and 73. The City Engineer on receiving notice of the fact promptly investigated the local situation. He found the water had subsided in the cellar, and then endeavored to ascertain whether the block had freed itself or whether an obstruction still remained. His officers opened the sewer in two places, both opposite and above No. 73, and after finding the sewer apparently running and discharging normally, applied the hose test and chip test. In each opening made hose was inserted and water let run in from a hydrant for a long period and apparently with result shewing a free discharge and free working of the main drain. Chips were put into the upper opening and caught as they came below at the next manhole, and the officers say that by this method of examination they satisfied themselves that whatever had caused a stoppage must by pressure have freed itself, that their examination was a usual and reasonable one and that at that time there was nothing in the conditions presenting themselves to indicate anything but a sewer in good working condition. The Plaintiff's case is that this examination was imperfect, that a partial stoppage was left in the sewer which ultimately on November 27th, 1910, practically closed the sewer, with the resultant damage to Plaintiff. I think the Plaintiff's case is based largely on speculation. It is that some sticks that were found in the block of November 1910 must have been lodged when the test of 1909 was made and must have remained there and ultimately caused the block of 1910. A sewer blocking and freeing itself is not uncommon, and I think it reasonably clear that this is what happened in the fall of 1909. At all events, I think the examination and tests by the City in the fall of 1909 were reasonable, and I also think

that because the sewer was found blocked in November, 1910 (and no complaint made in the meantime) it would not be reasonable to hold the Defendant's Officers guilty of negligence in their care of the sewer. There can be no suggestion that the block of November 1910 was other than due to accidental circumstances, it was promptly remedied upon notice received, and after the tests made upon the complaint of 1909 I am not disposed to hold that negligence can be charged in the keep and care of the sewer. If the partial block alleged by Plaintiff to have remained from and before October 1909 is to be held the cause of the block in November 1910, it is hard to understand the sewer doing its normal work without complaint for over a year and during all the floods and rains that must have occurred between the two dates mentioned. I think this theory cannot reasonably be made the basis of liability, and is obviously the product of speculation. It is met by a reasonable examination and reasonable tests made after the complaint in 1909 by evidence that reasonably satisfies me that no obstruction existed in the main sewer at the time of such examination, and when any occasion for complaint again occurred it was met by prompt and efficient remedy. To my mind the question of negligence turns upon the examination of the sewer made after the complaint of 1909. It was I think reasonable, and I feel obliged to find against the charge of negligence. The Plaintiff failing to satisfy me that there was negligence here on the part of the City officers in the care of the sewer, I must dismiss the Action with costs.

DRYSDALE J.

The long delay here in giving judgment I feel obliged to say was due to non-receipt of extended notes and exhibits.

A. D.

Internal Health.

The amount expended in this service was divided generally as follows:—

Cleaning unpaved streets.....	\$5742 57
" paved ".....	5497.98
" Catchpits.....	3066.28
Sprinkling (by contract only).....	2055.63
Removal of ashes and garbage.....	3439.72
Repairs, renewals, supplies, etc.....	3361.00

To the above should be added the cost of the work performed by the City teams in scavenging and sprinkling.

Incinerator.

Specifications have been prepared and tenders invited for a garbage incinerator to have a capacity of 50 tons in 24 hours, the heat to be used to develop power for operating crusher, motors, lighting, ventilating, etc.

City Property.

The work performed during the year included general repairs only.

The 3-ton motor truck was purchased from Hillis & Sons Limited, agents for the "Sampson."



A power spraying machine was obtained and used to exterminate the tussock moth on street trees.

An additional heating boiler was installed in the City Hall by Longard Bros.

Street Railway.

The Halifax Electric Tramway Company Limited, extended their line into Point Pleasant Park, from Owen Street to the southern end of Steele's Pond.

The Legislature passed an Act requiring the Company to extend their line from Oxford Street westwardly along Quinpool Road to the Arm Bridge. The line is to be in operation on or before October 31st, 1913.

Public Baths.

The Beach Bath was opened on June 21st and closed on September 15th. The number of bathers was—male, 3550, female 613; total 4163. In 1910 the figures were 5045,—695— and 5740, a total decrease of 1577. The expenditure was \$425.95. Receipts \$171.95.

Electric Work.

The usual investigations and tests were made by the City Electrician to discover conditions which would cause electrolysis. His report attached also shows the work done in connection with electric wiring. The statements show the underground work performed during the year.

Buildings.

1910-11	Total number of permits..	475	Total value	\$397,038.00
1911-12	“ “ “ “	441	“	\$526,000.00

New Buildings.			Additions, Alterations, etc.		
Month	No.	Value	Month	No.	Value
May.....	22	\$65,325	May.....	53	\$46,130
June.....	12	41,200	June.....	33	10,500
July.....	8	38,420	July.....	28	4,922
August.....	11	35,825	August.....	24	31,135
September.....	7	10,550	September.....	28	8,855
October.....	9	40,950	October.....	23	2,738
November.....	9	17,100	November.....	30	8,233
December.....	20	84,130	December.....	24	9,840
1912			1912		
January.....	3	1,275	January.....	13	2,860
February.....	2	5,000	February.....	10	5,160
March.....	4	18,400	March.....	23	8,880
April.....	11	13,380	April.....	34	14,118

Violations of the law reported to the City Solicitor during 1911-12:

Date of Report	Owner	Location	Viloation
Jan. 22, 1912..	Dept. of Militia and Defence.....	N. E. cor. Sackville and Albermarle sts	Altering building without a permit.

Many complaints are made by merchants protesting against the occupation of the sidewalks in the business district by builders. Under the building law, a builder is given a permit which authorizes him to enclose the sidewalk for such time as in his judgment he will require it and without charge. The result in most cases is that the enclosure is not removed until the whole building is finished. After the wall is erected, it is the custom of builders to use the sidewalk for storage of material which inspection often discovers to be rubbish only. This is a great inconvenience to the public and to merchants doing business in the neighbourhood.

The Building Inspector should be in a position to remove the enclosure as soon as in his judgment it is practicable to do so. To enable the inspector to do so a radical change is necessary. A permit for the use of the sidewalk in the most important business streets should be given for one month only; the contractor should be required to make a new application at the end of each month; if the contractor desires to enclose the sidewalk after three months he should be charged a good price for the privilege, to make it worth while to hasten the removal. Where the front walls are to be high, the contractor should be compelled to give the public the use of the sidewalk after the walls are up fifteen or twenty feet by the construction of an arcade. Our progress from village customs to city methods in some branches of City work is at snail speed.

Expenditure.

The report of the Clerk of Works shows the totals:—

Water Maintenance.....	\$103,671	87
Water Construction.....	15,447	19
Sewer Construction.....	55,340	75
Sewer Maintenance.....	1,000	00
Streets.....	34,049	27
Sidewalks.....	30,989	74
Internal Health, Street Cleaning, Scavenging, etc..	17,665	20
Patrol Cleaning paved streets.....	5,497	98
Street lighting.....	24,299	05
City Hall Lighting.....	835	50
Teams and Stables.....	7,525	11
City Property.....	7,398	93
Fire Insurance.....	692	70
Fuel, City Hall.....	1,098	82
Baths.....	425	95
Telephones.....	338	24
Electric Wiring Inspection.....	400	00
Workshops.....	13	95
Private Work.....	272	06
Charles Street Extension.....	14,262	40
Market.....	23,631	60
Fleming Park.....	150	50
	<hr/>	
	\$345,006	81
Increase in expenditure over 1910.....	72,332	82
Total Labor Payroll.....	122,389	56
Increase.....	2,861	35

The usual statements and reports are appended.

Respectfully submitted,

F. W. W. DOANE, *City Engineer.*

PROFESSOR STARKEY'S REPORT.

Montreal, December 18th, 1911.

"Altho the whole broad question of the purity of the water supply is involved in this report, still it will be expedient to study the matter under two separate headings, (1) The quality of the water in the several lakes, together with the sanitary conditions relating to the water sheds attached thereto; and (2) The state of the water in the distribution pipes, as it is supplied to the citizens of Halifax, paying particular attention to any influence exerted by the water meters connected with the house services.

1.—The lake water and the watersheds (a) Spruce Hill lake.

The watershed connected with this lake is comparatively speaking very small, and is quite free from any polluting source. The quality of the water caught on this area is good, and in its course to the lake picks up remarkably little in the way of solid matter whether soluble or in suspension; in fact the water contains chiefly a small amount of vegetable matter, and a trace of mineral substance, being therefore an exceedingly soft water (vide analyses in appendix.)

Both chemically and bacteriologically the quality of this water is excellent, and shows not the slightest trace of pollution.

(b) Long Lake.—The watershed of this lake is much more extensive than that of the other two lakes. In addition it is partly under cultivation on the western or far side. This fact alone would call for very careful inspection, because it is from scattered and infrequent habitations that small secretions are apt to find their way into the bodies of water derived from the watershed, on which these houses are situated. These pollutions being small in amount attract little attention, in fact often escape notice altogether, and are thus of an insidious character.

Personal investigation revealed two such sources of pollution, both situated on the west or far side of the lake. The first, and by far the larger, is the negro village. There is a very small stream, a ditch in fact, which takes its rise at the top of the hill, debouches to the left hand side of the road going up, finally making its way into Long Lake in the vicinity of the outlet into the Chain Lakes, picking up on its journey all the liquid refuse which soaks away from the huts or dwellings, and their

appurtenances, all along the line. The season was, and has been for some time, particularly dry, hence the amount of water in the stream was extremely little, and the soakage at the minimum, consequently the pollution did not show itself in the water derived from the lake. The second source of contamination consists of the farm houses situated on the far side of the lake, on the road leading to Spruce Hill Lake. The amount of drainage from these places is very small in amount, nothing like that derived from the negroes' cottages, but it is one of these insidious cases to which I referred above. Both of these cases are a real menace to the purity of the water in the lake and require, in my opinion, immediate attention to remove the danger.

I can assure you that when the rainy season arrives, the amount of pollution derivable from these sources, particularly from the negro village, will be very appreciable indeed. Under no circumstances ought the fact that up to now no dire results have ensued from the entry of these small amounts of polluting materials into the lake, to engender a sense of security, for I have no hesitation whatever in asserting that the infectious matter derived from one case of typhoid fever finding its way into the ditch, would most probably result in an explosion of enteric fever amongst the inhabitants of Halifax, consuming this lake water.

I could cite you case after case of well marked epidemics in large towns all over the world, caused by tiny pollutions of the main water supply, exactly similar to this present instance. Therefore, tackle it in time. I should also advise occasional inspection by the sanitary authorities of the cultivated land on the watershed of this lake, to see that no conditions be allowed which might tend to infection of the water.

(c) Chain Lakes.—There are two points in connection with this watershed to which I would call attention, the proximity of the railway track, and the part of the watershed nearest to the negro village.

With regard to the railway track, I feel that here we have a potential danger—potential because nothing of an untoward nature has as yet resulted from it, but I am not in a position to guarantee for one hour the continuance of that immunity which you have hitherto enjoyed.

Pollution may arise from workmen on the line, or from passing trains.

On my tour of inspection I found unmistakable signs of the closets on the trains having been utilized, and as the line approaches within 22 feet at one point, things are getting a little too near to be either pleasant or safe. The other menace on this lake is the proximity of the negro village at the far end. No visible signs of pollution were in evidence, but I should always keep a watchful eye upon the place.

This Chain Lake is the one of all the lakes which is going to prove the hardest for you to deal with, especially in the near future. The presence of the railway track in such close proximity to the lake appears to me an almost insurmountable difficulty, you simply cannot do anything with it—that is, anything feasible or practicable. The easiest and most rational solution is the one suggested by your city engineer, viz.: to give up using Chain Lake water altogether for drinking purposes. This method of tackling the problem would at the same time solve the difficulty regarding the pollution entering Long Lake, for it would be the easiest thing in the world to turn all the drainage from the negro village as well as that from the farm houses on the far side into the top end of Chain Lake.

I was informed that the volume of water in Chan Lake was really not used by the people of Halifax but that it had to run elsewhere under the scheme of riparian rights. If this be true I think your plan of action is pretty plain, and moreover, the maintenance of the purity of the waters in Long Lake and Spruce Lake would be fairly well assured. Under this scheme you would be required to maintain the watersheds of these two lakes free from all pollution. As the areas of these watersheds are comparatively small, it would not be too great burden upon the ratepayers of Halifax to purchase the lands outright, and so preserve them intact. If these suggestions are not workable or acceptable, there is no safe alternative but filtration, and this means money.

2. The next question we have to deal with is the influence (if any) which the meters placed on the water main, exert upon the quality of the water passing through them.

I examined specimens of various meters taken directly out of their places in houses whilst I was present. Some of them

had been in position several years, some only a few weeks. Some had fine screens. Some had coarse screens, and some had none at all.

The analyses appended show most clearly that these meters exert no influence whatever upon the character of the water passing through them.

The bacteriological examination is the more important in this case, and more striking proof could not be wished.

The five chemical variations are exactly such as we would expect in waters containing relatively large amounts of vegetable organic matter. This is seen most conclusively in the case of the analysis of the water of Long Lake. The sample was taken at the end of the lake nearest the dam, and farthest away from the outlet into Chain Lake, the wind at the time blowing towards the dam, causing quite an appreciable amount of suspended vegetable matter to drift towards the end. Chemically the difference is noticeable, but bacteriologically there is no difference. Now in the case of a meter, if any accumulated vegetable matter on the screen exerted any influence upon the water passing through them, the bacteria in the water would most certainly show an increase in numbers, because it would be impossible for that vegetable matter to decompose and disintegrate without giving bacteriological evidence.

From personal examination of these meters and their screens, together with the analyses, I have no hesitation whatever in saying that these meters exert no influence one way or the other upon the quality of the water passing through them. It was only on the finest meshed screens that I found anything at all—a few shreds of vegetable fibre which had obviously come down from the lakes, and this only on a screen which had been in use for several years. The screen in the meter is quite unnecessary, and when a meter is used without one, no possible objection could be raised against the use of such meters for then the water passes through exactly in the same way as through a piece of pipe.

All the screening necessary ought certainly to be done at the lakes, where the water enters the large mains.

With the terrific waste of water that is obviously taking place in Halifax, you cannot do without these meters very well, and from a sanitary standpoint there is no objection to their use whatever.

T. A. STARKEY, M. A., D. Ph.

REPORT FOREMAN OF WATER DEPARTMENT.

Halifax, N. S., May 1st, 1912.

F. W. W. Doane, Esq., City Engineer:

Sir:—I beg to submit for your information the annual report of stock belonging to the Water Department, mains laid, renewed or cleaned, also service pipes added with location of new buildings supplied with water during the year 1911.

Respectfully submitted,

E. MORRISON,

Foreman Water Department

New Mains Laid in 1911.

STREET	FROM	TO	High or Low Service	Cast Iron Main Pipe					Hydrants				Cost per Foot in Cents					TOTAL COST			
				3 in. Pipe—feet	6 in. Pipe—feet	9 in. Pipe—feet	JOINTS	No. of Valves	Length of Pipe in Feet	Size of Pipe in Inches	NUMBER	Number of Valves	Percentage of Rock	Pipes and Specials	Valves and Hydrants	Labour and Cartage	Lead and Gasket		Dynamite and Fuse	TOTAL	
Bliss.....	End of pipe...	36 feet West....	H	36			Lead							31.5		49.6	4.0		85.1	\$ 30.64	
Connaught Ave.	Quinpool Rd..	Jubilee Rd.....	L			1468	T&B	3						93.0	5.3	181.7	1.8	6.1	287.9	4226.30	
Cedar.....	Louisburg....	West to connect	H		535		T&B	1	13	6	1	1		60.8	19.0	19.0	0.3		99.2	432.22	
Maynard.....	End of pipe																				
Mott.....	south of Black	132 ft South....	H		132		T&B						100	60.0		143.4		7.6	143.4	279.23	
Pepperell.....	Oxford.....	East 135 feet....	L		135		T&B	1					15	65.8	14.8	51.6	0.5	1.0	133.2	179.18	
Preston.....	End o' pipe..	258ft to connect.	H		258		T&B						5	60.8		63.9		1.0	125.7	324.28	
	Sh r'ey.....	South 150 feetto connect.....	H		150		T&B	1						61.2	13.3		3.1		171.1	256.64	
Totals.....				36	1210	1468		6	13		1	1									

STREET MAINS REPLACED WITH LARGER MAINS, 1911.

LOCATION			Size inches.		Length in feet.	Cost.
Street.	From	To	Old.	New.		
✓ Granville...	Salter.....	Blower.....	4	6	220	\$422 59 ✓
✓ Agricola....	Bilby.....	Macara.....	6	9	238	481 04 ✓

OLD REMAINS RENEWED.

✓ Maynard...	Cogswell. . .	Falkland.....	6	6	365	637 82 ✓
✓ Falkland...	Maynard. . .	W. Side Maynard..	6	6	28	105 35 ✓
✓ Bauer.....	Cornwallis..	Falkland.....	6	6	361	447 36 ✓