

**CONSTRUCTION.—1894-5.**

Balance from 1893-4.....	\$ 9710 81
Sundry Amounts paid City Collector for Material Sold.....	236 77
Transfer from Maintenance.....	8,000 00
Sundry Collections per City Treasurer.....	285 00

\$18,232 58**EXPENDITURE.**

General Work.....	\$ 1,361 25	
Laying 6 inch Main North Street.....	73 36	
“ 6 “ Bloomfield “.....	2 30	
“ 6 “ King's Place.....	418 53	
“ 6 “ Edward Street.....	200 05	
“ 12 “ North “.....	290 89	
“ 4 “ Rhuland “.....	27 85	
“ 6 “ Fenwick “.....	18 87	
“ 6 “ Robie “ south from Charles Street.....	35 08	
Putting New Fire Plug in King's Place.....	13 40	
Hardware.....	939 23	
Brass and Iron Castings.....	839 76	
Granite.....	128 53	
Samuel Caldwell.....	} Paid into Court 1,000 00	
Bridget and Mary Hennessey.....		585 00
Susan Veith.....		80 00
Robt. Miller.....		1,100 00
Arbitrator's Fees in above cases.....	340 00	
Cement.....	3,763 99	
Lumber and Pitch Pine.....	149 45	
Gravel.....	156 61	
Truckage Cement.....	264 97	
Estate J. Flinn, Wharfrage.....	150 23	
Labor, New Pipe Line.....	1,258 24	
“ New Dam.....	2,361 08	
“ New Pipe House.....	92 35	
Paint.....	6 90	
Blocks.....	4 20	
Hack Hire.....	7 50	
Advertising.....	1 89	
W. & A. Moir, Sundry Materials etc.....	709 85	
Laying 6 inch Main to Sutcliffe's Metropole Building.....	14 51	
“ 9 “ North Starr Street.....	53 38	
“ 6 “ Edward Street.....	64 11	
	<u>16,513 36</u>	
Balance.....	<u>\$ 1,719 22</u>	

**NEW PIPE LINE.—1894-5.**

Balance Carried Forward 1893-4.....	\$13,899 34
Loan.....	15,000 00
Sundry Amounts Paid for Material Sold, etc.....	20 75
	<u>\$28,920 09</u>

## EXPENDITURE.

D. Y. Stewart & Co., Pipe and Special Castings.....	\$6,363 31
Labor 26 inch Main.....	5,626 90
“ New Dam.....	8,803 22
“ New Road.....	1,173 89
“ Quarrying Stone.....	1,305 93
Truckage of Pipe.....	282 62
“ Material, New Dam.....	714 84
A. McKinnon on Account Contract Trenching.....	2,160 30
Sand and Gravel.....	1,013 30
Hardware.....	272 49
Lumber.....	174 26
P. Kehoe, Fencing, Poles and Posts, New Road.....	173 50
Trustees P. Power for Land at St. Patrick's Home.....	250 00
Halifax Gas Co., Damages to Pipes.....	130 05
Jas. Monaghan & Son, Plumbing Work, etc.....	86 09
Dr. M. Murphy, Expert, Survey New Road.....	60 00
Austen Bros., Pumps.....	25 00
A. Knight, for Inspecting Pipe.....	19 29
Sundry Small Bills.....	17 75
Rubber Boots.....	11 00
Wagon Repairs.....	9 00
Paint.....	3 46
	28,676 20
Balance carried forward 1895-6.....	\$ 243 89

## MAINTENANCE.—1894-5.

City Treasurer, Collections for Water Rates.....	\$96,453 11
“ Collector, Sundry Amounts for Material Sold and Labor.....	287 93
	\$96,741 04

## EXPENDITURE.

Labor.....	\$ 9,751 15
Salaries.....	5,906 02
Transfer to Construction.....	8,000 00
Hardware.....	535 67
Brass and Iron Castings.....	349 23
Purchase Engineer's Horse and Board of Same.....	310 76
Board Foreman of Water's Horse.....	245 15
F. W. Christie, Surveying.....	259 87
Stationery and Advertising.....	242 16
Wedges and Repairs Pumps.....	178 75
Purchase No. 1 Edson Pressure and Recording Gauge.....	111 42
Sundry Expenses in re Opening Low Service Main.....	109 19
Telephone Rent.....	104 17
Concord Wagon, Paid Balance due.....	80 00
Coal.....	54 16
Granite.....	30 00

## BOARD OF WORKS REPORT.

M. Clayton, in re Damages.....	\$	25	00
Leather.....		27	05
Blacksmith's Work.....		18	79
Harness and Waggon Repairs.....		36	70
P. O. Stamps for Engineer's Office.....		10	00
Lumber.....		13	11
Dr. Martin Murphy, Expert Opinion.....		20	00
Gas Bill for Engine Workshops.....		7	18
B. G. Gray (Trustee Cogswell's Estate) Rent of Land.....		7	79
Sundry Small Bills.....		14	90
Interest.....		47,446	69
			<u>73,894 91</u>
Balance carried forward 1895-6.....			<u>\$22,846 83</u>

## BALANCE SHEET.—1894-5.

	Dr. Side.	Cr. Side.	Dr. Balance.	Cr. Balance.
Sewerage.....	\$ 78,819 11	\$ 78,817 90	\$ 1 21	
Permanent Pavement.....	14,282 51	14 591 89		\$ 309 38
City Property.....	2 794 85	3,589 26		794 41
Horses and Drivers.....	3,678 05	4,442 37		764 32
Lighting City Hall.....	748 33	1,000 00		251 67
Streets.....	18,700 47	18,699 87	60	
Internal Health.....	12,964 83	13,000 00		35 17
Insurance.....	847 96	1,500 00		652 04
Fuel.....	890 09	928 65		38 56
Telephones.....	295 89	300 00		4 11
Caretaker City Property.....	1,200 00	12 00 00		
"    Exhibition Building.....	364 00	364 00		
Allowance Commissioners.....	1,000 00	1,000 00		
Suspense.....	1,132 08	1,132 08		
Lighting Streets.....	15,987 50	16,000 00		12 50
New Pipe Line.....	143,614 14	143,858 03		243 89
Maintenance.....	73,894 91	9,674 04		22,846 13
Construction.....	16,513 36	18,232 58		1,719 22
Widening Cogswell Street.....	26 26		26 26	
			28 07	\$ 27,671 40
			Less	28 07
	<u>\$387,754 34</u>	<u>\$415,397 67</u>		\$ 27,643 33
Treasurer's Account.....	\$403,747 01	\$377,156 89		
City Collector's Acct. Transferred Treasurer.....	1,053 21			
	<u>\$404,800 22</u>	<u>\$377,156 89</u>	\$ 27,643 33	

# CITY ENGINEER'S REPORT.

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## CITY WORKS DEPARTMENT.

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*Mayor:*  
M. E. KEEFE,

*City Engineer:*  
F. W. W. DOANE.

*Assistant City Engineer:*  
H. W. JOHNSTON, JR.

*Junior Assistants:*  
W. P. MORRISON, A. M. PICKERING.

*Plumbing Inspector:*  
CLAUDE DONOVAN.

*Meter Inspector:*  
JOHN E. BURNS.

*Clerk of Works:*  
W. F. REILLY.

*Assistant Clerk:*  
JAMES HOPEWELL.

*Stenographer, Etc.:*  
MISS MINNIE HUNTER.

*Foreman of Works:*  
JOHN McDONALD.

*Foreman of Water Department:*  
EWAN MORRISON.

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CITY ENGINEER'S OFFICE, CITY HALL,  
HALIFAX, N. S., May 1, 1895.

*To His Worship the Mayor:*

SIR,—I beg to submit the first annual report of the City Works Department—my fourth annual report:

### WATER WORKS.

Operations were begun in this department as soon as the frost was out of the ground. The contractor completed the trenching for the duplicate.



## LOW SERVICE

Main, and the pipe was laid. The trench along the old main was excavated by day's work, and although heavy blasting was necessary, the only accident was a small split in the fifteen-inch High Service Main. The water was turned off for fifteen or twenty minutes, so that there was practically no interference with the Old Service during the progress of this work. The new main is laid through rock for a distance of 2,000 feet beside the old twenty-four inch Low Service Main (which is under the head from Lower Chain Lake) and the fifteen inch High Service Main (which is under a head of from 180 to 260 feet), and much credit is due to Foreman Morrison for the successful completion of this portion of the work. The pipe laying is all completed, except the main on North Starr Street and connections at Russell, Kaye and Young Streets with the High and Low Service. As stated in the last annual report, all pipe has turned and bored joints and is most satisfactory. Our experience in the past has shown that in laying down pipe lines, small leaks and flaws that were not detectable at the time the work was being done are apt to develop themselves after the pipes have been put to the practical test of every day work. With the new pipe there is no loss from this cause and the saving is incalculable.

## RIGHT OF WAY

was acquired last year, but Edward Walker, William Miller, Samuel Caldwell, the Veith Heirs and the Misses Hennessey would not accept the city's valuation and the price was fixed by arbitration. A settlement was effected with Edward Walker satisfactory to both sides. W. J. Veith was appointed by the City Council, Wm. Compton was selected by the Chief Justice, and James Shand was chosen by Samuel Caldwell, W. A. Hendry by Wm. Miller and the Veith Heirs, and R. J. Sweet by the Misses Hennessey. The awards made were enormous, and Mr. Veith refused to sign them. However, the city was obliged to pay, together with \$340.00, the cost of the arbitration. The cost of right-of-way was the only expenditure which exceeded the estimate.

The work at Chain Lakes could not be started until the

## NEW ROAD

was completed and the old road closed. The contractor, Mr. James

W. McDonald, failed to complete his contract and serious delay was caused to the other work. Due notice was given to his sureties and the city finished the road. Mr. McDonald had received \$3,890.18 and it cost \$1,356.83 to complete the work to the approval of the Provincial Engineer. The amount of the contract was \$4,339.00 and up to date the overexpenditure—\$908.01—has not been recovered by the city.

As soon as the Provincial Engineer gave permission to open the new road the old road was closed and work begun from Fenerty's dam to the lakes. The work popularly known as the "new pipe line" included in a general way an enormous quantity of work that has never been reported upon in detail. By no means least in importance was the raising of Lower Chain Lake by the construction of a

#### NEW DAM.

When the new pipe line scheme was first discussed it was proposed to locate the new dam at the site of Fenerty's dam above Kehoe's mill. A study of the conditions backed up by surveys and estimates lead to the adoption of a site near the old gate houses. After viewing the ground and examining the results of the surveys and estimates, no doubt remains in my mind that the most, if not the only, judicious way of solving the question has been chosen. The advantages to be gained by the adoption of the lower site were a greater depth of water at the intake and larger storage area. The head of water would be exactly the same as at the upper site. The greater depth of water would insure greater purity under ordinary circumstances; but in this case the ground to be flooded was a bog covered with decaying vegetable matter, the depth of which we have not ascertained, as our sounding rods would not reach bottom in some places. This vegetable soil furnishes the food for those minute organisms which impart disagreeable tastes and odors to stored water. The removal of this soil would be very expensive, and the cost would offset the advantage of greater storage capacity, more especially as Long Lake will hold, when raised, the whole rainfall during very dry seasons. An examination of the foundation at Fenerty's dam showed the formation to be a rotten, shaky ledge, which could never be made water-tight. This location would necessitate the construction of a dam reaching a height about thirty-five feet above the surface of the ground and twenty feet higher than if built at the upper site. No matter how well it

might be constructed, it would be considered a standing menace to the buildings lower down the valley, and judging from our experience in arbitrations, the city would be called upon to pay the full value of the properties. In addition to this the new dam would form a reservoir on the storage pond owned by Messrs. Fenerty and Kehce, and the damages claimed by them would be an important item in the cost. A comparison of estimates of cost of the two plans, including all work in connection, resulted decidedly in favor of the western location for the dam. The facts were laid before His Worship the Mayor, and after a personal investigation by him, it was decided to adopt the site near the old gate houses and extend the new main. The advantages gained were greater purity in the supply, a water-tight dam, a great reduction in the height, and consequently less danger, the avoidance of the necessity of removing the gate-keeper's house, stables and outhouses, and cleaning off deposits in the vicinity of them, greater distance of the intake from the road, and last, but by no means least, a great reduction in the cost. The new location has all the advantages of the abandoned site, while it has none of the disadvantages. The new road cannot contaminate the water at the intake, while at Fenerty's dam it would be on the margin of the lake. We have also avoided the necessity of burying 1,400 feet of the high service main under from 10 to 30 feet of water, where it could not be reached in case of accident in less than three or four days, during which time the supply would be cut off. In order to reach it at all it would be necessary to drain that portion of the lake below the old gate house, consequently the city would be without any water at all from either service.

As soon as the location was decided the extra pipe required was ordered and work on the dam started with George Low as foreman.

The work is not continuous, but is in reality two separate dams. The north dam is located immediately behind the old north gate-house, and extends from hill to hill across the valley, being supported in the middle by a natural counterfort. It consists of an earth and stone embankment, containing in its centre a core wall of concrete, four feet wide on top. An ample spillway, faced with granite, is located near the north end. The corewall reaches in places a considerable depth. The earth on each side of the wall has been laid in thin layers, well compacted, and the embankment protected on the lake face by stone paving. The old twelve inch waste pipe is retained for letting down water to the mill owners. The twenty-

four inch pipe was extended and the gate chamber will be raised so that it may be used with the new service. A twenty inch waste pipe was placed in the bottom of the spillway so that the Lower Chain Lake may be lowered rapidly should occasion require. The dam and spillway are constructed of sufficient height to permit the raising of Long Lake and Chain Lakes another foot. The lake was kept at a low level during the building of this dam, and as soon as the embankment was high enough the water was admitted to the north gate-house. Water began to make its appearance on the back of the dam and the settling basin was again drained. On investigation the leak was discovered under the twenty-four inch pipe where it passed through the core wall. It was filled up and surrounded with concrete of the best quality and the dam appears to be perfectly tight.

#### THE SOUTH DAM

is located between the old gate-house and the sluice gate. It is apparently perfectly water-tight. A concrete gate chamber, seventeen feet deep, is built in this dam and covered with a wooden gate house. It is provided with gates and waste valves, and can be well drained with a fifteen inch waste pipe. Both mains are connected with it, but the valves are so arranged that the services may be separated. A filter wall will be constructed in front of this dam during the present season. The cost of this work will be within the estimate.

The joints of the fifteen inch

#### HIGH SERVICE MAIN

were strapped with angle iron from the head of Upper Chain Lake to the lower side of the south dam. As the influence of vegetable growths is greater where the water is shallow and where the bottom is more exposed to the action of the sun and light, especially when the water is to fluctuate up and down, it was considered advisable to remove the surface of the old highway. A portion of the high service main was uncovered in excavating that portion of the old road to be flooded, (the material removed being used on the back of the new dams.) This part of the pipe will be covered with water but can be inspected readily from a boat. A portion of the ground to be flooded has been cleared well back from the flow line or high water contour and grubbed of all stumps, underbrush and shrubbery and the refuse burned. Part of this work is yet unfinished as it



will be necessary to acquire more land on the margin of the lakes. When the work at this reservoir is completed all parts exposed to the eye will be of neat and workmanlike appearance without any unnecessary ornamentation. The grounds will be improved and completed in a manner creditable to the City and this Department. All old sheds, stables and outbuildings will be removed from the neighbourhood of the gate houses.

Although the work was not completed during the season sufficient progress was made to allow the new main to be used and the formal ceremony of letting the water into the "New Pipe Line" was performed by His Worship the Mayor, assisted by the City Engineer, on the 13th day of December, 1894, in the presence of a large party, including aldermen, ex-aldermen, civic officials and citizens.

The cost of the work is within the estimate, and as far as completed is as follows:

Strapping High Service Main.....	\$ 1,450 62
27 Inch Main.....	83,145 27
Right of Way.....	5,485 00
24 Inch Main, Gottingen St.....	33,916 80
Dams.....	19,815 37
Gate House.....	1,113 32
Kaye St. Main.....	1,486 97
North " ".....	1,342 13
Grubbing.....	636 30
	\$148,391 78

To this amount will be added cost of	
Raising North Gate House.....	} Unfinished.
North Starr St. Main.....	
Right of Way, Henderson & Potts.....	
Filter Wall.....	

The new service has increased the average pressure all over the City. The average normal pressure on the 214 low service hydrants in March, 1894 was 27.4 pounds and in March, 1895, 35.48 pounds, an increase of 29½ per cent. The average pressure all over the city increased from 25.5 pounds to 32.15 pounds, or 26 per cent. In addition to the change made by the new main there has been a great increase in pressure caused by improvements in the distribution, better plumbing work in houses, introduction of meters and



rigid inspection. The work of the Plumbing Inspector is showing better results, and I am pleased to say that the total increase in pressure during the past four years is 47.4 per cent. With improved plumbing, use of meters, and strict inspection, we may expect the increase to continue.

The extra pressure after letting water into the new main caused a burst in the old pipe on Pickfork & Black's wharf. A statement is appended showing difference in pressure on each hydrant in the city before and after opening new pipe.

#### CLEANING LAKES AND MAINS.

The 24 inch low service main was cleaned with the Kennedy-Keating Scraper on October 19th. It was started from the lake at 7.50 p. m., passed the blow-off at the Arm at 8.00, Industrial School gate 8.15, and reached St. Andrew's Cross at 8.51.

The 15 inch high service main was cleaned November 20th. In consequence of the low state of Spruce Hill Lake it was feared that the pressure would not be sufficient to drive the 20 inch scraper, and the cleaning of the 20 inch main was postponed till spring, when the water will be higher.

#### SPRUCE HILL LAKES

are in the same condition as at the date of last report. The shore is lined in many places with decaying stumps, roots, sticks, etc., extending out into the lake. The water is also contaminated by two floating islands of turf and other vegetable matter. This decaying matter should have been removed long ago, and I am glad to be in a position to state that before the 1st of November, 1895, nothing will remain to pollute our high service reservoir. Dr. Campbell, in his paper read before the Nova Scotia Institute of Science, said that he found the Halifax water supply remarkably free from bacteriae. Dr. Lawson, in discussing the paper, agreed that the water was good, but claimed that it was dirty. This was a serious reflection on the Board of Works whose attention had been called to the condition of the lakes frequently during the last four years. It is gratifying to note that under the present management of the department this matter is being dealt with promptly. Besides removing decaying vegetable matter, steps should also be taken to preserve the purity of the water by securing, through purchase or expropriation a sufficient width of land around the borders of all

the lakes, and in some cases the whole water shed should be acquired. Hauling wood and stone across the lake should not be permitted, as the nuisance left on the surface of the ice does not add to the purity of the water when the ice melts. For sanitary reasons this source of defilement should receive prompt and earnest attention. While the danger may appear remote, it is nevertheless real and the mere thought of excrementitious discharges being allowed to enter the water used for domestic purposes is not a pleasant contemplation.

#### DEAD ENDS.

There are 77 dead ends in the water system of this city, of which 26 are permanent dead ends on 6 inch mains. These should not be allowed to exist, except in unavoidable places as the water becomes impure, dirt and sediment collects, there is greater danger of freezing, and the health, and perhaps the lives of those of our citizens who are compelled to use water from such pipes are endangered. I would recommend that as many as possible of these existing dead ends be connected with the large mains during the next year and that permanent dead ends be connected with the dead ends of sewers wherever practicable, thereby flushing the sewers as well as blowing out the dead water and dirt in the mains.

#### LEAKS.

As already noted, the blasting in the pipe trench caused a split in the bottom of the 15 inch high service main on May 31st. Water was off about 15 or 20 minutes only. The blow-off at Upper Chain Lake was opened, which reduced the pressure, and the split was stripped, the work occupying about three hours.

On June 6th a joint was blown out in the 15 inch high service main near Long Lake. Water was turned off at 9.30 a. m. and on at 3 p. m.

Sunday, July 1st, a joint was forced out in the 15 inch low service distribution main on South Park Street, opposite the Holy Cross Cemetery, causing considerable damage to the street. It was necessary to strike an alarm of fire from box 42 to summon the Water Department men, and the district was cut off at 4 p.m. The leak was repaired and water turned on at 10 a.m., July 2nd.

August 24th, high service turned off at 9.30 a.m. to repair a leak showing in the road at Lower Chain Lake above the pipe house. Water turned on at 2.30 p. m.

October 22nd, high service turned off at 2.45 p. m. to repair leak at Long Lake dump; turned on at 3.15 p. m.

October 29th, 24 inch low service turned off at 8 p. m. Leak in Chief Justice McDonald's field; repaired at 12.30 p.m.

November 19th, leak in high service main at Lower Chain Lake; water turned off 1 p. m., to 3.30 p. m.

November 20th, repaired three joints in high service at Lower Chain Lake while water was off to clean main.

November 24th, repaired leak at Lower Chain Lake in high service.

April 13th, repaired leak in bog near Umlah's, south of St. Margaret's Bay Road, high service; turned off 9 a. m., to 3 p. m.

The leaks at Long Lake (Nicholson's) dam have been reduced very much by the work performed there in 1892. In one place where there was a flow of two inches on the measuring weir it has been reduced to one-quarter inch. There is no doubt that these leaks could be stopped entirely by dumping more material on the face of the dam.

#### FRAZIL ICE

became troublesome about midnight November 28th, and the foreman and gate-keeper had a busy night. The whole low service supply was being drawn through the north sluice gate as the new gate house was not completed. By constant attention the gate was kept open until morning, when the ice stopped running. The new filter wall will prevent frazil ice from reaching the South gate house, and as it has ample capacity to supply both mains, no further trouble is anticipated from this source after the completion of the work.

#### WATER EXTENSIONS.

Sixteen petitions were received asking for the extension of main pipes. Of this number eight were granted. Five of the eight were short extensions to supply new dwelling houses.

Two hundred and forty-five feet of six inch pipe was laid on North Street west from the Robie Street main, and 621 feet of six inch pipe was laid on King's Place from North Street north, at the request of the numerous residents and property owners in that neighborhood.

On the petition of Forsyth, Sutcliffe & Company, the small main in Hollis Street was taken up from Cheapside to the Metropole

Building and six inch pipe laid instead, the petitioners paying half the cost. The old main was large enough for ordinary domestic service, but a six inch pipe was required in order to run the elevator at the Metropole Building.

The most important extension ordered was that to Willow Park. This large district was without fire protection and depended for domestic service on a few wells. During the dry season last Autumn the residents were obliged to haul water in casks from Robie Street and Kempt Road, men being detailed by the Water Department to open the hydrants at certain hours of the day.

Four plans were considered for this extension:—

1. From the west end of the pipe on North Street (at King's Place) to Windsor Street; thence north along Windsor Street, and west along Edinburgh Street.

2. From the west end of the pipe on Almon Street to Windsor Street; thence north and south.

3. From the end of the main on Windsor Street, north of Chebucto Road, north along Windsor Street.

4. From Quinpool Road north, along Windsor Street.

Plan No. 1 could not be adopted, as the pipe on North Street was too small to supply Willow Park for domestic service, while it would be practically useless for fire service.

Plan No. 2 was abandoned for the same reason; but I would recommend that in future extensions on Almon Street nine inch pipe be used, so that eventually Willow Park will be connected by a nine inch pipe with the Agricola Street main. The circulation would be better, and as future increase in the supply will come probably from the north, this district will get a more direct service.

Plan No. 3 would give a more direct service than No. 1 or 2, but the supply would come through the six inch pipe on Compton Avenue and the pressure would be weak, while in case of fire at Willow Park the supply must be cut off from the whole north end.

Plan No. 4 was adopted as the only one meeting all requirements. This plan is to lay a nine inch pipe from the high service main on Quinpool Road, taking up the six inch pipe now laid. This will give direct service and the best available fire and domestic pressure.

#### LOW WATER IN THE LAKES

was the cause of considerable anxiety during the Fall. The lakes fell steadily from the first week in June until the 5th day of November, when Long Lake was six feet four inches below the



waste weir—the lowest level on record. On the same date Spruce Hill Lake was four feet eleven inches below the waste weir, and remained very low all winter. Rain was expected in September, but as the weather continued fine, we were obliged to discontinue street watering. The low state of the water is easily accounted for. By reference to the record of the rainfall for the year 1894 in the city, it will be seen that it was less than that of any for twenty-five years previous, while the quantity of water flowing over Long Lake waste-way was 168,796,539 gallons less than in 1893. This condition was very general over the Maritime Provinces and New England States and reports show that many water supplies were never so low before.

#### METERS

The number of meters in use was increased during the year to 153. Where old closets provided with hopper cocks were replaced by cistern flush closets the meters were removed. More attention must be given to the meter system with the view of checking the waste caused principally by badly constructed and unprotected plumbing. The use of the comparatively small number of meters now in service, together with careful inspection has already made a marked improvement. This system must be extended, however, in order to check needless waste, improve and keep up our fire pressure, restore confidence in our water supply among the insurance companies, and prevent the necessity of looking for another source of supply, at enormous cost, which otherwise must inevitably come. Wherever waste is found by the Inspector a meter should be placed on the service pipe, and as another means of preventing waste a rule requiring automatic fixtures for all unmetered supplies should be rigidly enforced. Frequent protests have been made from some institutions where meters have been placed and efforts have been made to have them removed. This should be strenuously opposed. It is water we want, not money, and if any change is to be made it should be further reduction in the rates. While the meter remains they will be careful of the water, no matter what the rate is, but as soon as the meter is removed there will be no check on the consumption. A meter should be placed in every institution or building where the consumption is large and on every house where wilful waste is detected. Our most thoughtful citizens, appreciating the fact that our water supply is a limited quantity, will cheerfully sustain us in our efforts to preserve this supply in quantity as well as quality.



The rates charged for water supplied through meters were reduced, as shown in the accompanying statements, and while our rates were not high when compared with those of other cities it is probable that they will be still further reduced during the present year. The department is not only self-sustaining, but has a surplus. Legislation was obtained during the last session of Parliament authorizing the transfer of \$8,000 from Maintenance account to Construction account.

#### GENERAL.

2442 feet of cast iron distribution pipe was laid and 120 feet of that previously laid was removed making a total of        miles now in use, 28 service pipes were renewed and 134 houses supplied with water, making the total number of service pipes now in use

Six old fire hydrants were replaced with improved hydrants protected by frost jackets, and two new hydrants were set making the total 357. The total length of excavation made in carrying out the work was 7715 feet or 1.46 miles.

There are six free hydrants for domestic supply in the city. It is estimated that works built to afford fire protection cost three times as much as those built only for domestic supply. In many cities an average rate of about \$30.00 per hydrant is charged to the Fire Department. We not only keep up the fire service, but the Works Department is asked to pay the Fire Department for the time of horses and drivers sprinkling the streets. Domestic hydrants cost much more for repairs than fire hydrants, and this expense should be borne by those receiving direct benefit from the existence of such hydrants. I would recommend that in future domestic hydrants be locked and families using them be supplied with a key for, say, \$1.00 a year, payable in advance.

None of the old fire hydrants can be taken up or repaired until the water is turned off the main. This is a great nuisance to householders, and in future valves will be placed between the hydrant and the main. Two hydrants were frozen during the winter from the same cause. The pipe connecting with the main passed through a large old stone sewer, and during a cold night the temperature became so low in the sewer that the water froze in the pipe. These old sewers are very much larger than there is any necessity for, and they should be reconstructed. Before leaving the subject of fire supply I would respectfully suggest to the Council the advisability of having the building law amended to require on

all high buildings, such as that erected by the Nova Scotia Furnishing Company and the Metropole Building, an iron stand pipe provided with siamese hose connection and valves at the street level, and separate hose connections on each floor. If this is not adopted it will be impossible to fight a fire with water in such buildings.

I regret to say that we have only one drinking fountain in the city and one sanitary. The latter is not in a proper location. Sanitariums should be constructed underground on the old City Hall square with conveniences for the great number of people, male and female, crossing the ferry or marketing in the neighborhood. The entrance could be surmounted with a drinking fountain and light, and the fountain on Bedford Row removed to some other part of the city. Similar conveniences with protection for the cabmen should be provided under the parade near the Barrington Street entrance.

An Edson Recording Pressure Gauge has been placed in the City Engineer's Office at the City Hall.

The usual reports from the Foreman and Meter Inspector are appended.

#### SEWERS.

The total length of new sewers constructed was 17,509 feet or 3.31 miles. The average cost was \$3.53 per lineal foot. The most expensive work was on Proctor's Lane and Brunswick Street. The extra cost was caused by the character of the rock and depth of excavation. The cheapest work was on George Street from Water Street to Hollis Street. The trenching on Creighton Street and James Street was let to Donald Sutherland, and on Cunard Street to Thomas L. Kent. The sewer assessment amounts to 57 per cent. of the cost of work performed. The outfall at Marine and Fisheries' Wharf was extended on a plan similar to that adopted at Prince Street and DeWolf's Wharf. An automatic flush tank was placed at the end of the sewer in the north block of Hollis Street, and similar flush tanks should be constructed at the upper end of all dead ends on flat grades. The effect of the improvement at the Esplanade is more noticeable, and few, if any, complaints have been made respecting it.

Complete plans and records have been made of all sewers constructed under the Act to date. They show the location of sewer, drains, manholes, etc., with size, depth, grade, length and all other information required.

## CATCHPITS.

There were 93 new concrete catchpits constructed. A great many old pits still exist and complaints respecting bad odors may be expected until these nuisances no longer remain. They are being removed as fast as possible and will soon cease to offend the most sensitive nostril.

## HOUSE DRAINS AND PLUMBING.

The work of Mr. Donovan, the Plumbing Inspector, is becoming more valuable every year. Four hundred and forty-six permits were issued for laying drains. The number of houses from which complaints respecting defective plumbing were received was only 31, or a little more than one-half of the number reported during the previous year. Three of these were found in good order. In his report Mr. Donovan states that there is no doubt that many property owners are paying for plumbing work which they believe to be done in accordance with the rules and regulations of the City Health Board. Only four new houses were tested and only one of these stood the test. Requests were received frequently for the inspection of old plumbing where occupants felt uneasy and desired to know if everything was in good condition. These requests have been complied with promptly and peppermint or smoke tests used where necessary or practicable. Many times the case has been one of carelessness, ignorance or neglect, and I have no doubt has been the cause of serious illness.

Statistics have demonstrated clearly that in cities where the plumbing of buildings has been placed under official control the death rate has been lessened considerably, and I would be worthy of censure if I did not urge this matter before those whose official duties call them to provide the means of securing what actual experience has long since taught us is an absolute necessity. If the opponents of the plumbing law could see for themselves some of the carelessness and criminal negligence in plumbing work, I think all doubt would be removed as to the justice, importance and necessity of providing more efficient means for protecting the health and lives of our citizens. Those who have investigated this matter know that plumbing should mean more than simply getting the water into a house and conveying the waste out of it. At the last session of the Legislature an amendment to the City Charter was passed, and the plumbing regulations will soon become law. It

will be welcomed by all master plumbers and must result beneficially to every tenant. We must expect some opposition from the landlord, but public health should take precedence of the landlord's purse. The general sanitary condition of buildings throughout the city has improved rapidly since the passing of the City Health Act, and the Chief Inspector now holds a record of the sanitary history of each house which may be inspected gratis by would-be tenants. This record will be supplemented yearly. The sanitary condition of many districts could be greatly improved by cutting off and filling in the old drains and by abolishing privies wherever sewers have been constructed.

#### INTERNAL HEALTH.

The sanitary condition of the streets has been much improved during the last three years by the construction of concrete and asphalt sidewalks, substitution of granite gutters for cobble stones, paving Water Street, and macadamizing streets with the aid of the steam roller. Men have been employed constantly on the principal streets, instead of the old system of cleaning about once a month. It will be impossible for this Department to keep the streets clean until the Police Department enforces the law. Persons who make a dumping ground in front of their premises should be handled without gloves. While they are allowed to sweep or throw out paper, straw, ashes and rubbish to blow about, sometimes within an hour after the street has been cleaned, it is useless to try to change the reputation we have had in the past for dirty streets. I refer specially to the business streets, where it is a daily occurrence to see the shop or office boy sweeping rubbish out on the roadway. In most cities it is the pride of the citizen to see the street in front of his property clean and orderly; here, I am sorry to say, they do not assist us by aiding our endeavors to make the city a pride to themselves and their visitors and lessen the expense.

A new sprinkling cart was ordered and much better work will be done in the suburbs in consequence.

The contract for the removal of ashes and garbage was awarded to Peter Kiddy at \$62.50 per week. The sanitary regulations provide for the separation of ashes and garbage and an effort was made to carry out the law. The method employed was very unsatisfactory, but after a more practical arrangement is made and ashes kept in one receptacle, everything else in another, this work will be performed more systematically and thoroughly than ever before.



The question of garbage disposal is still unsettled. The quantity of night-soil to be removed prevents the adoption of any method except fire. In the meantime the ashes are being used for the sub-grading of streets, but the garbage is deposited at the dumps, while the night-soil is taken to the pit at Rockhead. This condition is disgraceful in this enlightened age and the Council should grapple with the matter without further delay.

#### PERMANENT PAVEMENT.

The work performed includes 1213.5 square yards of concrete sidewalk, 2268.3 square yards of asphalt sidewalk, 4906 ft. 10 inches of straight curb and 505 ft. 7 in. of circular curb set or reset, and 5538 ft. 6 in. of straight gutter and 534 ft. 3 in. of circular gutter laid or relaid.

The cost of concrete sidewalks averaged \$1.83 per square yard, a saving of ten cents per yard compared with last year. The cheapest work was done for \$1.69 per yard and the highest \$1.94, one cent above last year's average cost. An improvement was made in the corners by grooving the surface to give a foothold.

An asphalt sidewalk was laid on the north side of Spring Garden Road. It was laid under difficulties. The season was late and the weather bad. We were obliged to pay a big price for asphalt and purchase tools and plant. Notwithstanding the disadvantages the cost was only 70 cents per square yard. The work was not as satisfactory as we would desire, but the experience will be valuable in future work.

Considerable damage has been caused to the surface of permanent sidewalks by the use of picks and axes in removing ice. This should be prevented by the police and an example made of the first culprit.

Concrete is the most suitable permanent material for sidewalks on level streets. In the construction of flag stone sidewalks each flag should be large enough to cover the full width of the sidewalk in order to make permanent and satisfactory work that will resist the action of frost, etc. This brings the cost up above that of concrete. Brick if laid so that it will stand frost costs as much as concrete and is not popular among pedestrians. In winter the porous bricks absorb so much water that they are icy and slippery in freezing weather—quite as much so as concrete although not so noticeable in consequence of the greater number of joints. They



are also wet and disagreeable during thaws, and do not dry as rapidly as concrete. They wear unevenly, forming hollows or basins that hold water difficult to avoid on dark wet nights.

Asphalt, however, seems to be most satisfactory for hills and less important streets. While it is not permanent the cost will be not much more than one-third the cost of concrete. It must therefore be more generally used as our means are limited.

In many cities this work is done under a "Local Improvement Act" The proprietor's representing a majority in value petition the Council to lay a certain specified pavement on a certain street; the city after determining the life of the pavement use it as a basis to determine the time in which a loan necessary for the work will mature and assess the proprietors such per centage per annum as will cover principal and interest. No pavement is allowed unless approved of by the City Engineer, and in the case of street pavement when a choice has been made for a portion of the street and proves successful no other kind is allowed on the continuation of the street when the balance of the proprietors petition for it.

#### STREETS.

Street work was begun early in the season and was practically completed by the first of September. The largest pay roll (for all services) during the year was \$7,407 to 450 men and 94 teams.

It is very difficult to keep the cab stands in good repair, and I think it would be advisable to pave with granite where the horses stand.

Many suburban streets are not graded and the work cannot be attempted without a special appropriation. Houses are being built at different grades, and we shall have some difficulty in establishing a suitable grade. Where old buildings project we should be in a position to compel the owner to move back when renewals are being made. The building law should be amended, if necessary, to prevent repairs to old wooden shacks that had outlived their usefulness years ago. In changing the law snow guards should be provided for. It is at present dangerous to pass under many roofs during a thaw, Avalanches of snow fall on the sidewalk and pedestrians are obliged to seek the middle of the street for safety. We also need an amendment giving the Council the authority to change the limits of the brick district whenever they consider it advisable. It is useless, however, to make amendments unless they

are to be enforced without fear or favor. We also need an ordinance for street numbering, as the numbers on some streets are badly mixed. Many street names have been duplicated and changes should be made to prevent confusion.

#### CITY PROPERTY.

The Exhibition Building was repaired as far as the appropriation would permit, but still requires extensive repairs. It is a bill of expense and it seems impossible to keep it tight. Every gale starts new leaks.

A fence was erected around the lot on Kempt Road. The old City Wharf was thoroughly repaired, and a sea wall was constructed around the site of the old Fish Market.

Nothing further was done respecting the proposed fountain on the Parade. The city should complete the sidewalks around this square as it is visited by all tourists. In fact the city should set the example by laying a good sidewalk in front of all city property.

#### GENERAL.

In reviewing the past twelve months, the first year of the City Works Department, many improvements may be noted. The Board of Works was composed generally of the most experienced men in the Council and the chairmen were usually practical intelligent men, selected for their special fitness for the position. The system, however, was capable of much improvement and of late was not always conducted in the best interests of the taxpayers. In support of this statement I may compare results under the old system with those under the new, and give some of the advantages gained under the latter. The most startling change is in the cost of work. A reference to the records will show that the construction of sewers was becoming more expensive every year. In 1893 under the Board of Works, 16 sewers were constructed, having a total length of 8,532 feet. In 1894 the City Works Department with the same appropriation, constructed 41 sewers, 17,509 feet long, and had \$10,000 left at the end of the year. The stock on hand at the beginning of the two years was about the same. Two sewers were constructed for less than the assessment on the properties and one for \$4.21 more than the assessment. One of these was in Fort Massey clay and another had an average depth of rock excavation of two feet.

The cost of sidewalks was reduced from \$1.93 per square yard to \$1.83; curb setting from an average of 80 cents a foot to 57 cents in one instance, and other work in proportion.

The principal cause is in the employment of men. Formerly nearly every laborer who wanted work went to an Alderman, who sent him to the nearest foreman with instructions to employ him. If these men were discharged they were frequently sent back again and the foremen were afraid to complain; the consequence was that twice as many men were employed as the work required, and in spite of every effort to prevent it the practice was continued.

At the first of May, 1894, every foreman was instructed to give city workmen the preference, but under no circumstances to hire men unless their services were absolutely necessary, and as soon as any man was not required he was to be discharged promptly. Violation of this regulation by any foreman would result in dismissal. The change was very unpopular with the laborers, but the result is certainly in the interest of the taxpayers and if the city had received one hundred cents value in the past for every dollar expended there would not be so many sewers yet to be constructed.

In street work a change was made from the system followed in the past. Under the old ward system the money was often misappropriated by spending it on new streets the private property of speculators or electors in direct violation of the law. We have incurred the displeasure of some citizens by refusing to continue this illegal practice. The best argument in favor of this change, however, is that it is unpopular with those who have "axes to grind." Another misappropriation of street money which has been stopped was the custom of constructing sewers under the gutter so that owners of property would be relieved of the assessment called for by the Sewer Act. The amount provided for streets is too small to keep the streets in repairs without building sewers. All the street work estimated for last year was performed and the winter work attended to. A squad of men are employed repairing holes, ruts and bad crossings all over the city where formerly each ward must keep to itself. The most necessary work is done first and anything left undone will be first on the list for next year.

In Internal Health work the streets in the centre of the city are cleaned much more frequently and by reducing the number of men here as in other work we were able to continue the carts for the removal of ashes and garbage two months later than in 1893.

City horses and drivers had no idle time and left a good balance to their credit at the end of the year.

In fact, all bills were paid, and contrary to the usual custom, there was no overexpenditure in any service which the Department

had the power to regulate. All supplies and work, as far as possible, were let by contract to the lowest tender.

The change is especially satisfactory to the officials of the Department. In the clerk's office there is no difficulty in keeping all work up to date, and each pay day a statement is given to His Worship the Mayor and the Engineer, showing the exact condition of each appropriation. Formerly I had no access to the accounts and never could tell how much I had to spend. Now I have an opportunity of inspecting all pay-rolls and bills, and several improper expenditures, which had been running for some time, have been stopped in consequence. The cost of all work can also be furnished in detail, which was impossible under the old system. There is a great saving in the work of this office and less work to send to the Council. Instructions are given daily instead of weekly or fortnightly, and delay in carrying on work is prevented. Instead of a new chairman every year, with a new system of his own, each head of the Department will probably hold the position for three years.

The change adopted here is being advocated in many other cities. In New York the City Reform Committee advocated the abolition of Boards as heads of Departments and the placing of each Department under one man as the head. The tendency of the times is to concentrate more power and responsibility in the Mayor of a city and to reduce the power of Boards.

I desire to record my sincere thanks to His Worship the Mayor for his ever careful investigation and generous assistance in the discharge of my official duties. Our relations have been of a most friendly character, and the thorough attention which the Works Department has received from him has made it easy to settle many important matters in conference with him.

To every one in the Works Department, who, with honest purpose and faithful effort has striven to make it more valuable to the people of Halifax, hearty recognition of such service due and freely accorded. But, while much good work has been done during the past year, the unresting spirit of progress demands still better achievements in the next.

Trusting that the suggestions made and work performed may meet with your approval,

I have the honor to be, Sir,

Your obedient servant,

F. W. W. DOANE,

*City Engineer.*



## WATER DEPARTMENT OFFICE.

F. W. W. DOANE, ESQ.,  
City Engineer.

May 1, 1895.

SIR.—According to your instructions I have prepared the usual schedule of stock on hand, number of feet of main pipes and service pipes laid and renewed, number of new fire hydrants put down and number fitted with frost jackets; also length of main pipes recleaned in 1894.

All of which is respectfully submitted,

E. MORRISON,  
Foreman Water Department.

## Pipes Cleaned by Mechanical Scrapers during the Season of 1894.

DATE.	Time Occupied.	LOCALITY.	Diameter of Pipe in inches.	Length cleaned in feet.	Cost.	Remarks.
Oct. 19.	1 H. 1 M.	Low Service Main.....	24	13400	\$23.02	Recleaned.
Nov. 20.	2 H. 5 M.	High " " .....	15	29500	22.30	"

## New Street Mains, 1894.

STREET.	From.	To.	CAST IRON PIPE.				Hydrant Pipe.		Main Valves.		Hydrant Valves.	
			Length feet.			Joints.	Length feet.	Size inches.	Number Hydrants.	Number.	Size inches.	Number.
4 inch pipe.	6 inch pipe.	12 inch pipe.	4 inch pipe.	6 inch pipe.								
North .....	Gottingen .....	Brunswick .....			570	T & B			1	12		
" .....	Robie .....	King's Place .....		245		"			1	6		
King's Place .....	North .....	621 feet north .....		621		"	10	6	1	6		
Edward .....	South .....	229 " " .....		229		"			1	6		
Fenwick .....	East of Lucknow.	36 " east .....		36		"						
Robie .....	South of Charles.	63 " south .....		63		"						
Ruhland .....	Lucknow .....	272 " west .....	272			"			1	4		
Edward .....	Morris .....	Nth to end pipe .....		286		"			1	6		
Hollis .....	Cheapside .....	Metropole Bldg. .....		120		"						
" .....	Main Pipe .....	" " .....		22		"			1	6		
Totals .....			272	1622	570		10		1	7		



## Street Mains Replaced with Larger Pipe, 1894.

STREET.	From.	To.	Size in inches.		Length in ft.
			Old Pipe.	New Pipe.	
Hollis . . . . .	Cheapside . . . . .	Metropole Building . . . . .	3	6	120

## New Service Pipes, 1894.

$\frac{1}{2}$ inch—feet.	$\frac{3}{4}$ inch—feet.	1 inch—feet.	Total feet.
4398	74	67	4539

## House Services Renewed, 1894.

$\frac{1}{2}$ inch—feet.	$\frac{3}{4}$ inch—feet	1 inch—feet.	Total feet.
712	.....	.....	712

## New Hydrants, 1894.

STREET.	LOCATION.	Kind.	Service.	Size of pipe— inches.	No. of nozzles.	Distance valve from hydrant— feet.	Pressure Pounds.
King's Place . . . . .	300 feet from North St.	City.	High.	6	2		
Sackville . . . . .	S. E. corner S. Park . . . . .	City.	High.	6	3		

## Old Hydrants Renewed, 1894.

STREET.	LOCATION.
South Park .....	N. E. Corner Spring Garden Road.....
Spring Garden Road .....	Opposite Brenton Street .....
“ “ .....	N. W. Corner Dresden Row .....
“ “ .....	N. W. Corner Birmingham Street.....
“ “ .....	N. W. Corner Queen Street .....
“ “ .....	N. W. Corner Pleasant Street.....

## Pipe Stock on Hand April 30, 1895.

No. of Pieces.	Diameter.	Weight of one.	Weight in lbs.	Total Weight.	Value per lb.	Total Value.	Remarks.
1	27						
2	24	2555	5110	5110	1 $\frac{3}{4}$ c.	\$ 89 42	T. & B., 12 feet .....
4	24		9698	9698	1 $\frac{3}{4}$ c.	169 71	T. & B., 11 feet .....
6	20	1263	7578				
10	15	1200	12000				
82	12	680	55360				
13	10	550	7150				
51	9	538	27438				
98	8	386	32928				
166	6	280	46400				
21	5	222	4662				
313	4	156	48828				
32	3	130	4160				
153	1 $\frac{1}{2}$	26	3978				Stand pipes .....
71		12	852				Plates .....
210		6	1260				Caps .....
96		2	182	253256	2 $\frac{1}{4}$ c.	5698 26	Thimbles .....

## Joint Staves.

NUMBER OF PIECES.							Value.	
For 6 inch pipe.	For 9 inch pipe.	For 12 inch pipe.	For 15 inch pipe.	For 20 inch pipe.	For 24 inch pipe.	Keys.	Each.	TOTAL.
4000	1700	1000	1000	2000	5000	5000	\$0 01½ 0 00½	\$187 77 12 50

## Specials and Miscellaneous.

No. of Pieces	Diameter.	Description.	Weight of one in lbs.	Weight of Whole.	Total Weight.	Value per lb.	Total Value.
1	27	Saddle, 6" outlet	81	81			
2	27	Bell Mouth	831	1662			
1	24	Cap	290	290			
12	24	Thimbles	396	4752			
2	24	Saddle, 6" outlet	73	146			
4	20	Thimbles	230	920			
3	15	Double Branches	896	2688			
3	15	" " 6" outlet	660	1980			
1	15	Single Branch	812	812			
2	15	Y Branches	1012	2024			
9	15	Thimbles	234	2106			
1	15	Reducing to 6"	400	400			
1	15	Saddle 9" outlet	150	150			
1	15	" " 6" "	122	122			
3	12	Double Branches	615	1845			
2	12	" " 9" outlet	500	1000			
3	12	" " 6" "	475	1425			
2	12	Single " "	524	1048			
3	12	" " 9" outlet	494	1482			
3	12	" " 6" "	469	1407			
4	12	Reducing to 9"	240	960			
2	12	" " 6" with Faucet	200	400			
3	12	" " 6" without Faucet	200	600			
10	12	Thimbles	160	1600			
1	12	Saddle 3" outlet	86	86			
4	12	Caps	45	180	30166	.02½	\$678 73
4	9	Double Branches	411	1644			

*Specials and Miscellaneous.—Continued.*

No. of Pieces.	Diameter.	Description.	Weight of one in lbs.	Weight of Whole.	Total Weight.	Value per lb.	Total Value.
2	9	Double Branches, 9" and 3" outlet	450	900			
3	9	Single Branches	355	1065			
3	9	" " 6" outlet	306	918			
3	9	" " 4" "	250	750			
3	9	Reducing to 6"	121	363			
6	9	Thimbles	116	696			
5	9	Offsets	156	780			
7	9	Caps	34	238			
1	9	Saddle 4" outlet	45	45			
1	9	" 3" "	40	40			
6	6	Double Branches	555	3330			
1	6	" " 3" outlet	180	180			
12	6	Single "	209	2528			
8	6	" " 4" outlet	200	1600			
2	6	Y Branches	250	500			
3	6	Reducing to 4" with Faucet	105	315			
7	6	" " 4" without Faucet	75	525			
5	6	" " 3" with Faucet	114	570			
2	6	" " 3" without Faucet	105	210			
3	6	Offsets	140	410			
11	6	Thimbles	67	737			
9	6	Bends	136	1224			
16	6	Caps	19	304	19872	24	\$447 12
22	4	Double Branches	123	1706			
2	4	Single "	114	228			
2	4	Y Branches	96	192			
4	4	Reducing to 3" without Faucet	84	336			
3	4	" " 3" with Faucet	95	285			
5	4	Offsets	66	330			
13	4	Thimbles	29	377			
26	4	Caps	11	286			
1	3	Single Branch	81	81			
5	3	Crosses	90	450			
7	3	Thimbles	36	252			
1	3	Tee Branch	79	79			
	3	Caps	7				
	3	Single 2" outlet					
7	2	Double Branches	30	210			
4	2	Angle Branches	23	92	4904	24	\$110 34
6	24	Split Thimbles	620	3720			
1	20	"	453	453			
9	15	"	260	2340			
13	12	"	222	2886			
22	9	"	139	3058			
30	6	"	92	2760			
3	4	"	64	182			





## Valves.

Number.	Size Inches.	Description.	Value of Each.	Total Value.
1	12	Regulating Valve .....		\$206 66
1	6	“ “ .....		103 33
4	15	Stop Valves .....	\$100 00	400 00
3	12	“ .....	79 00	237 00
7	9	“ .....	26 00	182 00
36	6	“ .....	20 00	720 00
11	4	“ .....	16 00	176 00
1	3	“ .....	14 00	14 00
1	2	“ .....	9 00	9 00
8	1	Service Cocks .....	2 50	20 00
6	3	“ “ .....	2 00	12 00
100	2	“ “ .....	1 50	150 00

## Meters.

Number.	Size.	Description.	Value of Each.	Total Value.
10	6	Siemen's (in stock)	\$143 43	\$1434 30
2	4	" "	86 75	173 50
7	3	" "	65 67	459 69
1	2	" "	44 65	44 65
3	1	" "	21 50	64 50
27	$\frac{3}{4}$	" "	15 50	418 50
16	$\frac{1}{2}$	" "	14 50	232 00
1	1	Crown "	49 25	49 25
1	$\frac{3}{4}$	" "	37 92	37 92
1	$\frac{1}{2}$	" "	26 25	26 25
1	$\frac{1}{2}$	Frost	31 42	31 42
2	$\frac{1}{2}$	"	21 47	42 94
1	6	Siemen's (in use)	143 43	143 43
11	4	" "	86 75	954 25
15	3	" "	65 67	985 05
3	2	" "	44 65	133 95
1	$1\frac{1}{2}$	" "	34 42	34 42
7	1	" "	21 50	150 50
23	$\frac{3}{4}$	" "	15 50	356 50
82	$\frac{1}{2}$	" "	14 50	1189 00
1	1	Crown "	49 25	49 25
3	$\frac{3}{4}$	" "	37 92	113 76
2	$\frac{1}{2}$	" "	26 25	52 50
1	$\frac{1}{2}$	Frost	31 42	31 42

## Recapitulation.

Description.	Number.	Number of Pounds.	Value.
Pipes.....		268064	\$5957 39
Wooden Staves.....	14700		183 77
Key Wedges.....	5000		12 50
Branch Pipes.....		54946	1238 19
Split Thimbles.....		18466	461 64
Gun Metal Screws.....		354	212 40
Fire Hydrants.....	9		532 50
Castings for Hydrants.....		6330	164 02
Old Fire Hydrants.....	4		52 00
Brass Castings.....		150	52 50
Stop Valves.....	63		1738 00
Service Cocks.....	114		182 00
Pressure Regulating Valves.....	2		309 99
Pressure Gauges.....	5		50 00
Meters.....	222		7408 95
Gas Engines.....	1		475 50
Steam Engine and Pump.....	1		625 00
Pipe Tapping Machine.....	1		127 60
Winches.....	5		37 00
Tin Tubing.....		500	165 00
Hydrant Nozzles.....	18	72	43 20
“ Caps.....	20	200	6 00
Lead Pipe.....		350	14 00
Refined Iron.....		500	9 25
Platform Scales.....	2		50 00
Lathes.....	3		200 00
Blacksmith Tools.....			100 00
Total.....			\$20408 40

## Free Domestic Supply Hydrants.

STREET.	LOCATION.
Gottingen.....	N. E. Corner Kaye.....
Windsor.....	N. W. “ Duncan.....
Preston.....	S. W. “ Quinpool Road.....
“.....	West End Cedar.....
Louisburg.....	Corner Linden.....
Bland.....	S. E. Corner Inglis.....

## Free Pumps Maintained by City Water Department.

No.	LOCATION.
2	Tower Road.....
1	Leahyville.....
1	Lady Hammond Road.....
1	Kempt Road.....
1	Duffus Street.....
1	Acadia Street.....
1	Roome Street.....
4	Campbell Road.....

## Hydraulic Hoists in Operation 1894.

Name.	Business.	Size of Service.	How rated.
Kenney & Co.....	Dry Goods.....	4 inch.....	Meter.
Murdoch's Nephews.....	".....	4 ".....	"
Burns & Murray.....	".....	4 ".....	"
Metropole Building.....	Offices.....	6 ".....	"
Bauld, Gibson & Co.....	Groceries.....	4 ".....	"
Post Office.....	Post Office.....	3 ".....	"
Appraiser's Office.....	Warehouse.....	3 ".....	"
G. M. Smith & Co.....	Dry Goods.....	4 ".....	"
Smith Bros.....	".....	3 ".....	"
Stairs Son & Morrow.....	Hardware.....	4 ".....	"

## Detailed Precipitation for the Year 1894.

Day.	LOWER CHAIN LAKE.											
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			.05			.19	.39			.04		
2			.10		.36					.36		
3		.44				.13	.12	.12		.04	.39	.47
4	.17			.95	.02					.81		
5	.28								.18	.64	.60	
6				.38	.45	.06					.90	
7	.19		.03		.09	.07						
8		.26			.03				.03			
9			1.69					.57	.10	.70	.35	
10		.75					.04		.06	.35	.35	
11			.50				.11					
12	1.77		.14	.28			.13					1.12
13	.54			1.80							.07	.03
14				.25						.92	1.26	
15		1.08									.04	
16	.25		.12	.02				.43		.06		
17										.04	.05	
18		.28	.48					.04				
19			.05	.03					.06			
20		.30						1.45	.44	.03		
21	.11	.10	.42					.07			.31	
22				.52			.09					.12
23		.15	1.25	.07					.04			
24	.49		.59				.13					
25	.23		.55		.26						.11	.48
26			.07		.35			.85		.08		
27	.56										.50	.72
28				.09		.43						.98
29	1.62		1.11			.13	.04					.17
30	1.58					.88		.33				
31			.04		.63					.24		.63
Total...	7.79	3.36	4.91	6.67	2.19	2.89	1.05	3.86	0.91	4.31	4.93	4.72
Total for the Year.....47.59												



## Detailed Precipitation for the Year 1894.—Continued.

Day.	SPRUCE HILL LAKE.											
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	.40	....	.04	....	.68	.86	....	....	....	....	....
2	....	....	.07	....	.23	.25	.08	....	....	.37	....	.53
3	....	.32	....	....	....	....	....	....	....	....	.43	.11
4	.07	....	....	.75	....	.16	.15	.11	....	.50	....	....
5	.32	....	....	....	....	....	....	....	....	.95	.63	....
6	....	....	....	.40	.60	....	....	....	.45	....	.96	....
7	.14	....	....	....	.10	.07	....	....	....	....	....	....
8	....	.26	....	1.20	.05	1.05	....	....	....	....	.21	....
9	....	....	....	.40	....	.07	....	....	....	.80	.15	....
10	....	.90	....	....	....	.03	....	.53	.24	.35	.37	....
11	.53	....	.51	....	....	....	.05	....	.04	....	....	....
12	1.70	....	.15	.25	....	....	.04	....	....	....	....	1.20
13	.15	....	.07	.80	....	....	.13	....	....	....	....	....
14	....	....	....	.23	....	....	....	....	....	1.00	1.30	....
15	....	1.28	....	....	.02	....	.02	....	....	.05	.09	....
16	.27	....	.19	.07	....	....	....	....	....	.04	....	....
17	....	....	....	....	....	....	....	.54	....	....	.04	.02
18	....	.27	.40	....	....	....	....	....	....	....	....	....
19	.05	....	.05	....	....	....	....	....	....	....	.44	....
20	....	.28	....	....	....	....	....	.03	.05	.03	....	....
21	.03	.05	.50	....	....	....	1.51	.57	....	....	....	....
22	....	....	....	.60	....	....	.07	....	....	....	.37	.11
23	....	.08	1.05	.09	....	....	.11	....	....	....	.16	....
24	.49	....	....	.55	....	....	....	....	....	....	....	....
25	.20	....	.55	....	.30	.05	.17	....	....	....	.16	.50
26	....	....	.25	....	.16	....	....	....	....	.09	....	....
27	.80	....	....	....	....	....	....	.27	....	....	.36	.55
28	....	....	....	.07	....	....	....	....	....	....	....	1.10
29	1.50	....	1.05	....	....	.50	....	....	....	....	....	.15
30	....	....	....	....	....	.22	.01	....	....	....	....	....
31	....	....	....	....	....	....	....	.40	....	.20	....	.73
Total...	6.25	3.84	4.84	5.45	1.46	3.08	1.62	3.46	1.35	4.38	5.67	5.00
Total for the Year.....	46.40											

*Detailed Precipitation for the Year 1894—Continued.*

Day.	CITY OF HALIFAX.											
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	·010	.....	·020	·060	.....	·875	·298	.....	.....	.....	·230	.....
2	.....	·010	·030	.....	·049	·010	.....	.....	.....	·328	.....	·043
3	.....	·313	·080	.....	·300	·155	·100	·108	.....	·010	·063	·410
4	·098	.....	.....	·082	.....	.....	·042	·060	.....	·040	·340	.....
5	·370	.....	.....	·812	·030	.....	.....	.....	.....	1.270	.....	.....
6	·180	.....	.....	·060	·050	·030	.....	.....	·152	.....	1.504	·050
7	·140	.....	·020	·400	·578	·936	0.60	.....	.....	.....	.....	.....
8	·100	·254	·010	.....	·055	·195	.....	.....	.....	.....	.....	.....
9	.....	.....	.....	·640	.....	·010	.....	0.90	·220	·658	·313	.....
10	.....	·100	.....	·100	.....	.....	·030	·522	.....	·123	·211	.....
11	.....	1.004	.....	.....	.....	.....	·054	.....	·048	·280	·306	.....
12	1.570	.....	·591	·050	·030	.....	·095	.....	.....	.....	.....	·497
13	·250	.....	·095	·894	.....	.....	·030	.....	.....	.....	.....	·680
14	.....	.....	.....	·827	.....	.....	.....	.....	.....	·793	·968	·040
15	.....	·864	.....	·162	·020	.....	.....	.....	.....	·184	·320	.....
16	·212	·244	·135	·070	.....	.....	.....	·399	.....	.....	.....	·012
17	.....	.....	·040	.....	.....	.....	.....	·072	.....	·082	·035	·020
18	.....	·322	·110	.....	.....	.....	.....	.....	.....	.....	.....	.....
19	·042	.....	·118	.....	.....	.....	.....	·030	·020	.....	·480	.....
20	.....	·270	.....	.....	.....	.....	.....	·704	·390	·040	·031	.....
21	·030	·020	.....	·020	.....	.....	·020	·852	·140	.....	.....	.....
22	·056	.....	·220	·017	.....	.....	·128	·048	.....	.....	·382	·108
23	.....	·060	·300	·700	.....	.....	.....	.....	·020	.....	.....	.....
24	·142	·020	·050	·630	.....	.....	.....	.....	·020	.....	·148	.....
25	·602	.....	·090	·010	·365	.....	·192	.....	.....	.....	·010	·522
26	.....	.....	·774	.....	·132	.....	.....	·752	.....	.....	·040	.....
27	·450	.....	.....	·020	.....	.....	.....	.....	.....	·060	·394	.....
28	·020	.....	·020	·024	.....	·492	.....	.....	.....	.....	·010	1.243
29	.....	.....	·380	·090	.....	.....	.....	·021	.....	.....	.....	·685
30	2.93	.....	·540	.....	·010	1.100	·010	.....	.....	.....	.....	.....
31	·120	.....	.....	.....	·130	.....	.....	·330	.....	.....	.....	·252
Total	7.122	3.571	3.623	5.648	1.769	3.803	1.059	3.993	1.010	3.863	5.785	4.562

Total for the Year..... 45.808.

## Total Precipitation for the Year 1894.

1894.	LOWER CHAIN LAKE.				SPRUCE HILL LAKE.				CITY OF HALIFAX.		
	Snow.	Melted Snow.	Rain.	Total.	Snow.	Melted Snow.	Rain.	Total.	Melted Snow.	Rain.	Total.
January .....	47.00	6.06	1.73	7.79	46.75	5.18	1.07	6.25	5.390	1.732	7.122
February .....	8.25	1.11	2.25	3.36	7.25	1.48	2.36	3.84	0.700	2.871	3.571
March .....	24.50	3.38	1.53	4.91	21.00	3.19	1.65	4.84	1.900	1.723	3.623
April .....	23.00	3.43	3.24	3.67	24.00	3.02	2.43	5.45	2.226	3.422	5.648
May .....			2.19	2.19			1.46	1.46		1.769	1.769
June .....			2.89	2.89			3.08	3.08		3.803	3.803
July .....			1.05	1.05			1.62	1.62		1.059	1.059
August .....			3.86	3.86			3.46	3.46		3.993	3.993
September .....			0.91	0.91			1.35	1.35		1.010	1.010
October .....			4.31	4.31			4.38	4.38		3.863	3.863
November .....	6.50	0.84	4.09	4.93	7.50	0.78	4.89	5.67	0.363	5.422	5.785
December .....	9.50	1.10	3.62	4.72	11.75	1.41	3.59	5.00	0.662	3.900	4.562
Total .....	118.75	15.92	31.67	47.59	118.25	15.06	31.34	46.40	11.241	34.567	45.808

## Gallons Discharged Over Long Lake Waste Weir During 1894.

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		13,441,414		2,053,123	3,771,748							
2		13,441,414		725,898	2,053,123							
3		10,665,474		2,935,888	725,898							
4		10,665,474		2,935,888	256,678							
5		10,665,474	725,898	10,665,474								
6		5,807,185	2,053,123	38,025,069								
7		2,053,123	8,112,524	38,025,069	725,898							
8		725,898	16,424,984	30,173,996	1,333,376							
9		725,898	19,600,783	22,953,449	1,333,376							
10		256,678	19,600,783	16,424,984	1,333,376							
11		725,898	19,600,783	12,026,531	725,898							
12		2,053,123	19,600,783	8,112,524	256,678							
13		2,053,123	19,600,783	10,665,474								
14		1,333,376	19,600,783	13,441,414								
15		725,898	19,600,783	14,910,137								
16		2,053,123	19,600,783	16,424,984								
17		2,053,123	13,441,414	17,985,975								
18		3,771,748	10,665,474	24,698,988								
19		4,742,175	5,807,185	24,698,988								
20		3,771,748	5,807,185	24,698,988								
21		5,807,185	5,807,185	22,953,449								
22		5,807,185	5,807,185	30,173,996								
23		5,507,185	5,807,185	38,025,069								
24		3,771,748	5,807,185	34,026,476								
25		2,935,888	5,807,185	38,025,069								
26		2,053,123	8,112,524	30,173,996								
27		725,898	8,112,524	22,953,449								
28			6,929,096	14,910,137								
29	725,898		5,807,185	10,665,474								
30	5,807,185		5,807,185	8,112,524								
31	10,665,474		5,807,185									
Totals.	17,198,557	118,639,579	189,455,675	582,602,480	12,516,049							

Total for the year, 920,412,340.

LONG LAKE.					SPRUCE HILL LAKE.			
1894.	Lowest point reached during the month.	Highest point reached during the month.	Monthly precipitation in inches at gauge at Chain Lake.	Monthly precipitation in City of Halifax.	1894.	Lowest point reached during the month.	Highest point reached during the month.	Monthly precipitation in inches at gauge at Sp. Hill Lake.
Jan. 24..	205.45				Jan. 1		363.03	
" 31		206.24	7.79	7.12	" 24	362.59		6.25
Feb. 1		206.28			Feb. 10	362.76		
" 28	205.99		3.36	3.57	" 21		363.01	3.84
Mar. 3	205.95				Mar. 2	362.76		
" 9		206.36	4.91	3.62	" 30		363.50	4.84
April 2	206.03				April 1	363.46		5.54
" 6		206.57	6.67	5.65	" 24		364.09	
May 1		206.11			May 1		363.84	
" 31	205.18		2.19	1.77	" 30	363.09		1.46
June 9		204.91	2.89	3.80	June 2		363.14	
" 28	204.70				" 29	362.46		3.08
July 4		205.49			July 1		362.46	
" 31	203.33		1.05	1.06	" 31	361.42		1.62
Aug. 1		203.29			Aug. 1		361.38	
" 31	201.83		3.86	3.99	" 31	360.30		3.46
Sept. 1		201.74			Sept. 1		360.30	
" 30	200.12		0.91	1.01	" 30	359.14		1.35
Oct. 16		200.29			Oct. 15		359.14	
" 30	199.83		4.31	3.86	" 31	358.55		4.38
Nov. 5	199.66				Nov. 5	358.42		
" 28		201.99	4.93	5.42	" 17		359.22	5.67
Dec. 12	201.41				Dec. 12	358.51		
" 31		202.83	4.72	3.90	" 30		359.14	5.00
Totals			47.59	45.808				46.40

Level of measurement at Long Lake is 205.99.  
 " " " Spruce Hill " 363.34.



## Records Compared 1879-94.

Year.	Total Precipitation at Chain Lake.	Lowest Level of Long Lake below Waste Weir.		Total Precipitation at Spruce Hill Lake.	Lowest Level of Spruce Hill Lake below Waste Weir.		Total Precipitation in the City of Halifax.
	Inches.	Feet.	Inches.	Inches.	Feet.	Inches.	Inches.
1879	40.76	4	6 $\frac{1}{2}$	.....	.....	..	47.70
1880	51.45	3	10 $\frac{3}{4}$	.....	.....	..	52.752
1881	46.65	3	0 $\frac{1}{4}$	.....	2	3	51.755
1882	56.089	2	6 $\frac{1}{4}$	.....	2	0	62.022
1883	46.201	4	5 $\frac{1}{4}$	.....	3	3	58.112
1884	59.252	3	9 $\frac{3}{4}$	.....	2	0 $\frac{1}{2}$	63.278
1885	47.995	4	5	.....	3	0 $\frac{1}{2}$	56.629
1886	46.60	2	3	.....	2	0	57.29
1887	59.820	3	10	.....	3	8 $\frac{1}{4}$	57.253
1888	68.525	1	5	67.21	2	2	66.294
1889	46.810	5	11	49.10	4	4	48.659
1890	59.38	4	2	60.78	3	11 $\frac{3}{4}$	60.103
1891	57.105	3	6 $\frac{1}{4}$	58.99	2	9 $\frac{1}{4}$	58.669
1892	58.97	2	11 $\frac{1}{2}$	60.19	2	5 $\frac{3}{4}$	53.69
1893	57.26	3	11 $\frac{1}{4}$	57.98	2	9 $\frac{1}{2}$	58.74
1894	47.59	6	4	46.40	4	11	45.808

Records of rainfall at lakes not reliable. City record made by Dominion Government Meteorological Agent.

## Total Precipitation at Lower Chain Lake, 1876-94.

Month.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
								Rainfall Only.	Rainfall Only.	Rainfall Only.
January .....	5.755	2.135	6.19	1.50	7.41	3.30	6.512	2.142	4.36	5.38
February .....	9.462	1.91	2.67	1.50	5.36	5.07	5.565	0.977	3.89	1.73
March .....	6.28	7.703	9.58	5.28	3.60	5.85	6.392	3.725	5.65	1.855
April .....	3.28	3.00	2.38	2.78	3.29	3.43	3.895	2.505	7.99	4.255
May .....	4.84	4.11	4.66	4.40	4.17	1.89	3.325	9.585	3.882	4.185
June .....	3.003	3.345	4.07	1.21	2.59	4.60	4.085	2.425	4.285	3.290
July .....	4.432	3.197	1.38	3.45	2.90	3.52	5.459	2.295	8.99	5.645
August .....	0.865	3.59	3.24	5.70	4.68	3.30	3.400	4.710	3.07	2.445
September .....	5.195	3.205	1.02	2.45	5.75	3.28	6.140	3.500	1.975	2.005
October .....	3.93	5.320	3.90	4.73	3.26	4.09	7.525	6.370	2.66	6.435
November .....	6.115	6.253	7.06	5.54	4.85	3.50	1.245	3.317	7.14	5.070
December .....	4.48	3.275	4.12	2.22	3.59	6.82	2.565	4.650	5.36	5.700
Totals .....	57.637	47.043	50.27	40.76	51.45	48.65	56.089	46.201	59.252	47.995

*Total Precipitation at Lower Chain Lake, 1876-94.—(Continued.)*

Month.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
	Rainfall Only.								
January.....	7.68	8.010	7.94	5.43	3.56	8.85	6.56	5.47	7.79
February.....	1.70	6.860	7.305	5.39	4.71	7.39	2.57	6.94	3.36
March.....	1.47	4.935	4.20	2.57	9.57	2.45	8.20	2.03	4.91
April.....	0.40	7.255	4.135	4.70	2.72	3.47	2.31	3.99	6.67
May.....	8.59	2.435	2.715	3.84	3.73	4.105	5.49	4.15	2.19
June.....	2.22	2.165	4.555	4.16	3.01	3.80	4.24	1.21	2.89
July.....	5.72	1.605	5.465	3.155	1.86	3.76	3.82	4.49	1.05
August.....	5.67	9.160	6.605	3.345	6.71	2.61	8.62	6.16	3.86
September.....	3.30	2.295	5.91	1.465	5.35	2.25	2.16	5.14	0.91
October.....	2.24	2.995	7.425	3.735	7.03	11.77	3.34	5.20	4.31
November.....	5.45	7.470	6.15	6.35	4.14	2.49	9.21	3.65	4.93
December.....	2.16	4.635	6.12	2.67	6.99	4.16	2.45	8.83	4.72
Totals.....	46.60	59.820	68.525	46.810	59.38	57.105	58.97	57.26	47.59

## Total Precipitation at Spruce Hill Lake, 1887-94.

Month.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
January .....	7.392	6.92	5.37	3.90	8.40	6.57	4.40	6.25
February .....	6.953	7.07	6.06	4.29	8.21	2.99	6.79	3.84
March .....	4.280	3.65	3.45	10.28	3.44	7.93	2.10	4.84
April .....	7.135	4.95	5.74	2.89	3.24	2.75	4.02	5.45
May .....	2.670	2.49	3.85	4.02	4.36	5.69	4.33	1.46
June .....	2.190	4.33	3.27	3.10	3.93	4.20	1.21	3.08
July .....	1.610	5.70	3.29	1.83	4.26	3.31	4.45	1.62
August .....	9.240	6.14	2.79	6.43	3.19	9.81	5.78	3.46
September .....	3.710	5.73	1.50	5.07	2.68	2.12	5.08	1.35
October .....	3.030	7.12	3.93	6.83	11.47	3.38	5.81	4.38
November .....	7.310	7.12	6.94	4.48	1.65	8.42	3.48	5.67
December .....	3.970	5.99	2.91	7.66	4.16	3.02	10.53	5.00
Totals .....	59.490	67.21	49.10	60.78	58.99	60.19	57.98	46.40

## Total Precipitation at Halifax, N. S.

Month.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.
January . . . .	4.53	7.11	3.73	3.88	7.83	5.42	3.94	3.576	4.200
February . . .	4.38	10.34	5.88	4.49	1.61	5.31	5.83	6.401	1.809
March . . . . .	7.95	3.02	6.16	5.37	4.09	3.98	2.13	6.329	8.666
April . . . . .	2.57	3.91	4.88	2.85	2.86	4.55	3.38	3.208	3.801
May . . . . .	5.57	3.19	2.59	4.44	2.34	4.77	3.98	5.662	4.024
June . . . . .	3.92	1.69	2.96	4.23	2.96	7.92	4.07	3.376	3.841
July . . . . .	2.92	3.21	3.38	2.88	3.90	2.29	5.61	3.914	4.468
August . . . . .	2.58	2.20	3.69	6.82	4.45	3.37	3.55	1.909	3.539
September . .	1.57	3.33	4.81	1.41	4.48	5.04	2.06	6.094	3.164
October . . . .	7.30	6.85	4.49	4.88	8.63	2.46	9.98	4.076	6.857
November . . .	5.47	6.28	4.18	6.65	7.98	3.58	5.54	7.397	8.678
December . . .	5.77	6.06	4.39	6.16	4.31	5.49	1.61	3.164	4.493
Totals . . . .	54.53	57.13	51.14	54.06	55.44	54.18	51.48	55.106	57.540



## Total Precipitation at Halifax, N. S.—(Continued.)

Month.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
January . . . .	7.534	4.400	7.738	3.607	6.840	6.930	4.406	6.388	8.67
February . . . .	2.697	3.001	5.122	5.329	5.949	3.860	6.161	5.090	3.84
March . . . . .	10.274	6.044	3.365	6.556	7.068	4.941	7.034	3.889	4.03
April . . . . .	3.452	3.481	4.797	3.498	4.824	3.703	7.213	3.520	0.82
May . . . . .	5.769	4.687	4.088	2.460	4.677	8.613	3.629	3.282	8.82
June . . . . .	4.477	1.191	1.343	5.301	5.507	3.322	3.773	2.749	2.71
July . . . . .	1.483	3.843	3.086	3.177	5.071	3.542	8.294	5.817	6.53
August . . . . .	3.127	4.827	3.920	3.062	3.925	5.342	2.771	3.001	4.53
September . . . .	.800	2.600	5.702	3.105	5.914	3.864	1.788	2.497	4.46
October . . . . .	5.060	4.760	4.590	4.206	7.403	5.841	3.093	6.280	2.13
November . . . .	6.909	4.837	4.710	4.420	1.392	3.478	5.992	5.423	5.28
December . . . .	5.120	4.029	4.291	7.034	3.452	6.678	9.124	8.693	5.47
Totals . . . . .	56.702	47.700	52.752	51.755	62.022	58.112	63.278	56.629	57.29

Total Precipitation at Halifax, N. S.—(Continued.)

Month.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.
January . . . .	7.656	5.442	4.391	3.963	8.383	6.321	4.781	7.122
February . . . .	6.735	6.284	6.181	4.645	8.740	2.605	5.979	3.571
March . . . . .	4.629	4.310	2.046	9.889	2.685	5.986	2.303	3.623
April . . . . .	6.386	3.675	7.403	2.958	4.010	2.653	4.209	5.648
May . . . . .	2.126	2.877	3.871	3.970	4.195	5.459	5.054	1.769
June . . . . .	2.121	4.939	3.755	3.440	4.131	3.638	1.753	3.803
July . . . . .	2.045	5.001	2.668	2.141	4.003	2.710	4.757	1.059
August . . . . .	8.351	7.000	2.633	7.042	3.385	6.809	5.954	3.993
September . . . .	3.308	5.331	1.399	4.534	3.052	1.744	4.391	1.010
October . . . . .	3.058	6.859	4.179	6.603	9.621	3.472	5.640	3.863
November . . . . .	6.718	6.772	7.145	3.716	2.388	9.240	3.760	5.785
December . . . . .	4.120	7.764	2.988	7.202	4.076	3.053	10.167	4.562
Totals . . . . .	57.253	66.294	48.659	60.103	58.669	53.690	58.748	45.808

This table compiled from returns published by the Meteorological Agent of the Dominion Government.

### Detailed Cost of New Pipe Line.

#### RIGHT OF WAY.

Patrick Kehoe.	9280.	Square feet	.....	\$ 100 00
Thomas Gooley.	12448.	"	.....	200 00
J. M. Chisholm.	14720.	"	.....	300 00
Estate of P. Power. (St. Patrick's Home.)	13248.	"	.....	250 00
Henry Walker.	12992.	"	.....	400 00
William Walker	11600.	"	.....	175 00
Edward Walker.	2720.	"	.....	60 00
Robert Miller.	18400.	"	.....	1600 00
Samuel Caldwell.	12720	"	.....	1075 00
Veith Estate.	2240.	"	.....	100 00
Henderson & Potts.	4448.	"	.....	
Mary and Bridget Hennessey.	12880.	"	.....	885 00
Arbitration Expenses.....			.....	340 00
				<u>\$5485 00</u>

#### EXTENSION OF NORTH STARR STREET.

Joseph Kaye.	13432.80	Square feet	.....	\$ 700 00
L. R. Kaye.	1900.	"	.....	200 00
J. Ryan.	1863.20	"	.....	400 00
Estate of P. Power.	6084.60	"	.....	480 00
	23,280.60			<u>\$1780 00</u>

#### PIPE YARD.

Dr. James Walker.	18000	Square feet	.....	<u>\$1061 99</u>
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## 27-INCH MAIN.

1736.2035 tons of 27 inch turned and bored pipe at \$32.05 .....	\$55645 32
29161 lbs of 27 inch hub and spigot pipe. (132 ft.) .....	510 31
19152 " 24 " " " ( 72 ft.) .....	335 16
8840 " 12 " " " (117 ft.) .....	154 70
6-27 inch bends, 5.589 tons at \$56 10 .....	313 54
1-27 " bevel collar, Class A. 0.383 tons at 56 10 .....	21 49
2-27 " " " C. 0 7475 " 56 10 .....	41 93
1-27 " sleeve " A. 0.3 " 49 55 .....	14 87
1-27 " " " B. 0.313 " 49 55 .....	15 51
1-27 x 24 in-4 way branch, 2 ends flanged 1.246 tons at \$56 10 .....	69 90
1-27 x 12 in-3 " " blow off, 12 in flanged 1.1425 tons at \$56 10 .....	64 09
1-27 in. blank, flanged faced 0.244 " 56 10 .....	13 69
1-27 inch valve 2.425 tons .....	250 63
1-12 " " on blow off 0.312 " .....	37 72
550-24 inch staves at .01 $\frac{1}{2}$ .....	6 87
200-12 " " .01 $\frac{1}{2}$ .....	2 50
Truckage of Pipes, Valves and Specials .....	2231 94
Inspection of 1746.1685 tons Pipes and Specials at .40 .....	698 47
Andrew Knight, Inspection at Glasgow .....	19 29
Excavation for Pipes, (Archibald McKinnon) .....	10894 90
Pipe Laying, Back Filling, (labor and truckage,) &c .....	10907 26
Black Bros. & Co., Hardware .....	202 45
H. H. Fuller & Co., " .....	251 08
Henderson & Potts, Paint .....	16 69
John Davison, Lumber .....	66 50
Brookfield Bros., " .....	13 60
W. & A. Moir, Gearing for Winch .....	41 24
Bentley & Fleming, Rollers .....	12 00
Wm. Grant, Lead .....	44 99
M. Frizzle, Handspike .....	1 50
J. A. Thomson, Castings .....	10 00
M. Kehoe, Fencing .....	4 50
Joseph Fleming " .....	10 00
Wm. Roche, Leather for Pumps .....	5 00
Charles Walker, Field Stone .....	10 00
John Stairs, Packing .....	7 50
M. J. Power, Flat Waggon .....	50 00
Telegrams and Sundries .....	70 10
Annand Publishing Co., Advertising .....	43 93
Blackadar Bros., " .....	30 46
Cab Hire .....	3 50
Freight on Cases .....	14

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**\$83145 27**

## \*LOWER CHAIN LAKE DAM.

5 Pieces of 20 inch Pipe, 6315 lbs .....	\$ 126 30
1—20 inch valve .....	116 97
1—length of 9 inch pipe .....	10 76
2 " 24 " 6384 lbs .....	111 72
5 " 12 " 3400 " (45 ft) .....	59 50
1—32 x 24 in. Bellmouth 721 " at \$49.55 ton .....	17 86
1—24 in. bevel collar 684 " " 56.10 " .....	19 19
*1699 Barrels Portland Cement .....	3863 95
Thomas Robinson, Truckage of Cement .....	246 94
Imperial Government, Gravel .....	20 00
Lewis Heffler, Gravel delivered Horse Shoe Island .....	1051 61
Capt. Church, Sand .....	46 35
Capt. Naas, " .....	51 95
Dr. Flinn, Wharfage on Sand and Gravel .....	150 23
Thomas Robinson, Truckage of Sand and Gravel, 33050 bush .....	626 24
Labor and Truckage .....	11232 93
Granite for Waste Weir, (quarrying and dressing) .....	1509 84
J. A. Thompson, Castings .....	59 60
Longard Bros., Pump .....	11 85
Austen Bros., " .....	25 60
W. N. Brown, Wheelbarrows .....	9 00
H. H. Fuller & Co., Hardware .....	251 08
Cragg Bros. & Co., Cans .....	5 70
John Davison, Lumber .....	157 83
Brookfield Bros., " .....	9 47
McManus, Rubber Boots .....	11 00
W. H. Pallister, Cask .....	50
Cab Hire .....	12 00
	<u>\$19815 37</u>

\*Includes concrete portion of gate house.

## \*GATE HOUSE.

John Kline, Granite .....	\$128 53
J. A. Thomson, Castings .....	7 20
W. & A. Moir, Gearing and Frames for Gates .....	709 85
" " " for Screens .....	7 09
Labor .....	92 35
Bentley & Flemming, Pitch Pine for Screen Chambers .....	70 15
John Davison, Lumber .....	55 18
H. H. Fuller, Hardware .....	15 21
Jas. Dempster & Co., Doors .....	22 01
Henderson & Potts, Paint .....	5 75
	<u>\$1113 32</u>

\*Does not include concrete work.



## GOTTINGEN STREET 24 INCH MAIN.

652.904 Tons of 24-inch Turned and Bored Pipe at \$32.05 per ton.....	\$20,925 57
Thomas Robinson, Truckage on Pipes, at \$1.25 per ton.....	816 13
Inspection at 40 cts. per ton.....	261 16
1-6 way Branch, 24 x 12 x 15 in., Cogswell St., 1,366 tons, at \$56.10 ton.....	76 63
1-4 " 24 x 12 in., Cornwallis St., 0.98 tons, at \$56.10 ton.....	54 98
1-3 " 24 x 12 in., North " 0.846 " at \$56.10 ".....	47 46
1-3 " 24 x 9 in., " " 0.836 " at \$56.10 ".....	46 90
1-3 " 24 x 12 in., Bilby " 0.874 " at \$56.10 ".....	49 03
1-3 " 24 x 12 in., Kaye " 0.858 " at \$56.10 ".....	48 13
1-12 in. Y at Bilby St., 0.295 tons, at \$49.55.....	14 62
1-9 in. Y at North St., 0.230 " at \$49.55.....	11 40
Thomas Robinson, Truckage of Specials, 5.76 tons, at \$1.25 ton.....	7 20
4-24 in. Valves, 3875 lbs. each, at \$199.53.....	798 12
2-15 in. " 871 " at \$58.40.....	116 80
4-12 in. " 624 " at \$37.72.....	150 88
1-9 in. ".....	23 85
Thomas Robinson, Truckage of Valves, 9.557 tons, at \$1.25.....	11 95
Excavation, Pipe Laying, Back Filling, etc.....	9,160 69
Halifax Gas Light Co., Alterations and Repairs.....	130 00
Brookfield, Lumber.....	50 00
Freight on Steam Drill and Boiler.....	56 00
MacDonald & Co., Hose for Drill.....	28 10
S. Cunard & Co., Coal.....	5 36
1,284 lbs. Lead, at 3½ cts.....	44 94
160 feet of 9 in. Crock Pipe, at 35 cts.....	56 00
50 " 6 in. " at 18 cts.....	9 00
6,000 Bricks, at \$10.00.....	60 00
129 bushels Sand.....	6 45
8 bbls. Cement at \$2.35.....	18 80
1 24-in. Sleeve, 396 lbs., at 2½ cts.....	9 90
1,235 lbs. Dynamite, at 42¾ cts.....	527 96
3,800 lbs. Electric Fuse, at 3¾ cts.....	142 50
Black Bros., Hardware.....	50 00
Arch. McPatridge, Glazing.....	4 50
Wm. Judge, ".....	1 20
Baldwin & Co., Lanterns.....	8 50
George Monaghan, Altering Drain.....	86 09

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**\$33,916 83**

## KAYE ST. 12 INCH MAIN, GOTTINGEN ST. TO NORTH STARR ST.

810 feet of 12 inch turned and bored pipe, 67,050 lbs., at \$32.05 ton.....	\$1,074 48
Truckage, at \$1.25 ton /	
Inspection, at 40cts. " { .....	55 32
1—12 in. valve.....	37 72
Excavation. Pipe Laying, Back Filling, etc.....	319 45
	<u>\$1,486 97</u>

## NORTH ST. 12 INCH MAIN, BRUNSWICK ST. TO GOTTINGEN ST.

570 feet of 12 in. turned and bored pipe, 49,025 lbs., at \$32 05 ton.....	\$785 60
Truckage and Inspection, at \$1.65 ton .....	40 44
1—3 way branch, 12 x 12 in., 524 lbs., at 2½ cts .....	11 79
1—12 in. valve .....	37 72
30 lbs. Lead .....	1 05
50 lbs. Dynamite, at 36 cts .....	18 00
100 lbs Electric Fuse, at 3½ cts .....	3 37
2 lbs. Gasket, at 8 cts .....	16
Excavation, Pipe laying, Back filling, etc.....	444 00
	<u>\$1,342 13</u>

## \*INSPECTION OF PIPES, SPECIALS AND VALVES.

Inspection at Halifax .....	\$300 50
" " Glasgow (E. Morrison).....	709 14
	<u>\$1,009 64</u>

## STRAPPING JOINTS, 15 INCH, HIGH SERVICE MAIN.

John Patterson, Straps .....	\$362 00
Labor, etc .....	976 12
3000—15 in. Staves, at 1¼ cts.....	37 50
6000 Key Wedges, at 1¼ cts.....	75 00
	<u>\$1,450 62</u>

\*Charged separately in each work.