

CR.

Paid Advertising .....	\$ 126 00
Stationery .....	10 80
Application fee returned .....	9 00
Barristers' fees .....	200 00
Cabs and Trucks .....	5 00
Witness fees .....	7 00
Printers: .....	11 50
Salary of Inspector .....	1016 66
Treasurer .....	16276 70
	<u>          \$17662 66</u>

Your obedient servant,

H. HAVELOCK BANKS,  
*License Inspector.*

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## REPORT OF CLERK OF WORKS.

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CITY WORKS OFFICE,

HALIFAX, N. S., May 1st, 1902.

*To His Worship the Mayor:—*

SIR,—I herewith beg to submit for your information the Annual Report of this department for the Civic year 1901—1902.

I have the honor to be, Sir,

Your obedient Servant,

JAMES J. HOPEWELL,

*Clerk of Works.*

# ANNUAL REPORT

## DEPARTMENT OF CITY WORKS

### 1901-1902.

#### Water Maintenance.

1901.		
May 1.	By Balance brought forward, 1900-01 .....	\$36223 93
	Water Rates, etc., per City Collector .....	76165 14
	City Work Office, collections deposited Treasurer .....	1016 36
		\$113405 43

#### EXPENDITURE.

Interest .....	\$48036 51
Labor .....	10148 84
Salaries .....	4626 00
Sinking Fund .....	2000 00
Water construction, transfer for material used .....	591 74
Horses and drivers, transfer for board Engineers and Foreman's horses .....	256 00
J. W. Beggs & Son, water meters .....	365 13
Longard Bros., brass castings .....	209 79
J. A. Thomson, iron castings .....	248 96
T. C. Allen & Co., stationery for Engineer's, Clerk of Works and Typewriter .....	287 25
Black Bros. & Co., hardware .....	181 08
N. S. Telephone Co., Ltd., rent .....	150 00
Bras D'Or Lime Co., lime .....	100 20
Thomas Robinson, part board and sundries Engineers horse .....	96 35
W. H. Isnor, part board and sundries Foreman of Water, horse .....	95 75
Farquhar Bros., lead .....	101 84
Arthur Fordham, leather .....	68 43
S. Cunard & Co., coal, blacksmith's shop .....	54 00
Sundry advertising .....	49 83
Sundry repairs to Engineer's and Water Foreman's waggons .....	50 25
Macdonald & Co., machinist work and brass castings .....	134 15
Miss Allison, making duplicate water bills .....	30 00
Robinson Bros., truckage pipe .....	26 04

Horseshoeing and harness repairs Water Foreman's horse .....	\$ 37 11	
Edward Hunter, brass castings .....	18 20	
W. & A. Moir, machinists' work .....	16 03	
Austen Bros , 4 rubber deaphragms .....	16 00	
Wm. McFatrige, tank testing meters .....	15 00	
J. Davison & Son, lumber .....	13 38	
J. C. Merlin, wooden wedges .....	12 36	
Crump & Perrior, repair drain .....	11 98	
1 Plumber's furnace and 1 force pump .....	20 00	
Veterinary services Engineer's and Water Foreman's horses .....	10 00	
Ice .....	10 00	
Peoples Heat & Light Co., Ltd., gas .....	7 30	
Salt .....	2 25	
Typewriter's repairs .....	1 50	
Locksmithing .....	2 80	
Streets, transfer for material .....	69 69	
City property, transfer for material .....	29 35	
Subscription Engineering Record .....	5 00	
W. C. Anderson, 1 box candles .....	1 20	
		\$68207 29
Credit balance carried forward 1902-03 .....		\$45198 14

## COST OF WORK.

	Labor.	Material.	Total Cost.
Labor at shop, turnkeys, etc .....	\$3933 45		\$3933 45
Service repairs .....	2630 62		2630 62
Removing material from city workshop to stockyard .....	46 21		46 21
Repairs stopcocks, meters, fireplugs .....	1583 72		1583 72
Repairs bursts and leaks .....	604 31		604 31
Grubbing and cleaning Chain Lakes .....	228 79		228 79
Service extension .....	953 39	\$493 21	1446 60
Testing and piling 6" pipe at city lot .....	92 62		92 62
College St. 6" main west of gate Exhibition Building .....	62 67	76 40	139 07
Plover St. 6" main south of Pleasant Avenue .....	98 73	411 25	509 98
Chebucto Road 6" main west of Windsor St .....	34 46	133 65	168 11
Owen St. 6" main .....	396 08	429 10	825 18
North St. 6" main west of Windsor St .....	212 63	92 70	305 33
Mott St. corner Selden, trench from water pipe .....	54 19	2 48	56 67
Monastery of Good Shepherd, 3" pipe .....	72 66	72 64	145 30
Military Gymnasium, fireplug .....	50 60	130 70	181 30
H. H. Dockyard, 6" main .....	537 60	631 30	1168 90
Morris St., 6" main replacing 3" .....	262 07	192 12	454 19
Summer St., 6" main replacing 3" .....	352 17	355 86	708 03
Africville well .....	47 58	47 56	95 14
New Infirmary, Barrington St., difference pipe .....		18 85	18 85
Census of water fittings to date .....	69 11		69 11
Woodside Sugar Refinery, cleaning 6" main .....	269 41	141 71	411 12
Replacing old with 5 frost jacket fireplugs .....	87 50	435 82	523 32

## Water Construction.

1901.

## EXPENDITURE.

May 1. To Balance brought forward, 1900-01 .....	\$14430 26
D. Y. Stewart & Co., pipes, specials, duty, freight, etc.....	8678 62
Labor.....	2621 27
Black Bros. & Co., lead pipe, etc.....	519 40
J. A. Thomson, iron castings.....	275 95
McDonald & Co., brass castings .....	100 80
Acadia Powder Co., dynamite, fuses .....	90 00
Robinson Bros., truckage, pipe.....	88 08
A. L. Knight, fees testing pipe before shipment.	44 24
W. & A. Moir, machinist work.....	15 00
Day & Kinsman, 2 pipe hydrants .....	13 00
Longard Bros., brass castings.....	8 60
Henderson & Potts, paint.....	1 40
Herald Publishing Co., advertising. ....	1 00
	<hr/>
	\$26887 62

## CR.

By Loan.....	\$25000 00
Maintenance, transfer for pipe used .....	423 75
City Work office, collections deposited Treasurer	2196 60
Maintenance, transfer for material used .....	167 99
	<hr/>
	27788 34
Credit balance carried forward, 1902-03 .....	<u>\$900 72</u>

## Sewerage.

1901.

May 1. By Balance brought forward, 1900-01 .....	\$18965 07
Collections sewer frontages per collector.....	22875 17
“ City Works office .....	519 20
Streets, transfer for material used .....	311 30
Permanent Pavements, transfer for material used	90 70
	<hr/>
	\$42761 44

## EXPENDITURE.

Labor.....	\$8400 52
Salaries .....	2650 00
Cement .....	3364 28
Horses and drivers, transfer for work done.....	2827 49
City property, transfer for work done.....	20 78
Reid & Archibald .....	789 00
Beazley Bros., lighterage pipe, etc., per contract Ogilvie St. outlet .....	740 00
Beazley Bros., lighterage pipe, etc., per contract Prince St. outlet .....	181 00

Brookfield Bros., drain pipe .....	\$ 632 17
Jas Freda, sand and gravel .....	865 92
Brick .....	404 26
Acadia Powder Co., dynamite fuse, etc. ....	277 10
W. D. Yeadon, granite manhole, catchpit curbs ....	147 00
Black Bros. & Co., hardware .....	160 63
Lumber .....	102 29
Poor's Asylum, concrete work .....	859 35
S. Cunard & Co., coal .....	33 75
J. A. Thomson, iron castings .....	30 78
Macdonald & Co., brass castings .....	15 95
Longard Bros., repairing sewer pumps .....	23 43
W. H. Isnor, part board Street Foreman's horse....	54 00
12 dozen pick shovel handles .....	12 00
Army Pay Department, rent letting No. 120.....	4 87
Glazing and sundries .....	8 25
Sundry advertising and printing.....	32 11
Duncan McLeod, 16 weeks gratuity.....	80 00
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	\$22716 93
Credit balance carried forward, 1902-03.....	<hr/>
	\$20044 51

## COST OF WORK.

	Labor.	Material.	Total Cost.
Laurence St sewer .....	\$1598 73	\$ 414 13	\$2012 86
Fawson St. sewer .....	139 34	58 66	198 00
Windsor St. and Chebucto Road sewer.....	1519 25	666 30	2185 55
Macara St. sewer .....	1021 05	363 44	1384 49
Prince St. sewer outlet .....	334 10	2588 25	2922 35
Granville St. corner George, putting drain to catchpit	10 06		10 06
George St. corner Granville, " " .....	11 19		11 19
Catchpit building .....	381 70	213 93	595 63
General work .....	2583 34		2583 34
Summer St. stone shed one half cost taking down....	21 61		21 61

## Streets.

1901.		
May 1. By Appropriation .....		\$22000 00
City Works office, collections deposited with Treasurer .....		1010 80
City Treasurer, collections deposited.....		40 21
Permanent pavement, transfer for material used.		88 73
Maintenance transfer for material used .....		69 69
Young Avenue, transfer for material used .....		33 84
Street Fund, transfer to balance .....		2198 82
		<hr/>
		\$25442 09

## EXPENDITURE.

Labor .....	\$16507 13
Wm. D. Yeaton, granite.....	1229 18
Half salary Foreman of Streets .....	500 00
George Harvey, stone for crusher.....	652 97
Ed. Hartnett, " .....	134 46
Jas P. Murray, " .....	412 28
Association for Improving Condition of the Poor, broken stone.....	2267 97
Coal for crusher and steam roller .....	415 77
Repairs on " " .....	327 52
Farquhar Bros., street numbers.....	185 04
Labor, } Building shed for breaking stone.	203 52
Lumber, } .....	161 74
Hardware, } .....	44 15
Roofing material } .....	36 00
Imperial Oil Co., machine oil for crusher and steam roller .....	147 48
Lumber .....	209 32
Hardware .....	87 59
Robinson Bros., truckage new steam roller.....	29 00
Jas. Shand, appraiser's fees, Fenwick St.....	20 00
C. Davies, " " .....	12 00
R. Johnston, " " .....	12 00
Geo. Richie, allowance obtaining money from court..	15 00
J. A. McKinnon, " " .....	15 00
W. H. Isnor, 1 months board McDonald's horse....	18 00
J. O'Connell, horseshoeing " .....	11 20
O'Brien, Mont & Co., repairs waggon " .....	8 45
Dr. Jakeman, veterinary service " .....	5 00
Sundry hack hire for inspection streets.....	13 50
Harness repairs and felt per Engineer's office. ....	22 45
J. A. Thomson, iron castings.....	4 30
Blackadar Bros., advertising tenders, etc.....	9 06
Brookfield Bros, 2 barrels cement .....	5 20
Deposit refund per Treasurer.....	22 77
Telegrams per Engineer.....	1 74
Poor's Asylum, making concrete work .....	27 72
Horses and drivers, transfer for work done .....	172 16
Sewerage, " " .....	311 30
Permanent pavement, " " .....	1152 97
Steam roller loan, No. 2, transfer to balance cost to that date .....	30 07
Steam roller loan, No 1, transfer to balance account to that date.....	46
	<hr/>
	\$25441 47
Unexpended balance.....	<hr/> <hr/> 0 62

## Horses and Drivers.

1902.			
May 1.	By Appropriation .....		\$2000 00
	Permanent pavement, transfer for work done and material used .....		157 29
	Streets, transfer for work done and material used .....		172 16
	Sewerage, do do .....		2687 49
	Young Avenue sewer do do .....		672 40
	Fuel, do do .....		37 20
	Internal Health, do do .....		500 00
	Sewerage, transfer 35 weeks board, McDonald's horse .....		140 00
	Maintenance, transfer 64 weeks board Engineer and Morrison's horse .....		256 00
	City Works office, collected for work done .....		103 90
			<hr/>
			\$6726 44

## EXPENDITURE.

Salaries city drivers .....	\$	2622 25
Purchase 4 horses .....		572 00
Hay, straw and bran .....		837 65
Chop feed .....		573 00
Oats .....		135 05
Harness and harness repairs .....		189 37
Horseshoeing .....		201 61
Labor, .....		354 65
Lumber .....		287 53
Asphalting and concreting floor .....		208 98
Roofing material .....		194 40
Putting in drain .....		87 14
Hardware .....	} New stables.	79 88
Brass strainers and castings .....		25 30
Iron feed boxes .....		17 75
Electrical fittings and W. I. pipe .....		25 43
Glazing .....		6 64
Mineral paint .....		29 70
Labor repairing waggons and sleighs .....		141 92
Lumber .....		15 19
Electric light for stables .....		23 09
Coal .....		13 50
Veterinary service .....	40 00	
Advertising .....	9 50	
Mowing hay .....	6 00	
2 barrels lime .....	2 00	
J. A. Leaman & Co., neatsfoot oil .....	3 00	
W. Eaton & Son, 2 barrels carrots .....	2 50	
City property, transfer for material .....	14 96	
		<hr/>
		\$6719 99
Unexpended balance .....		<u>\$ 6 45</u>



## City Property.

1901.		
May 1.	By Appropriation .....	\$ 2000 00
	Longard Bros., 1 old lamp post .....	2 00
	Horses and drivers, transfer for lumber .....	14 96
	Maintenance, transfer for stationery .....	29 35
	Sewerage, transfer for material .....	20 78

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 \$ 2067 09

## EXPENDITURE.

General work .....	\$ 392 70
D'Arcy Weatherbe, 1000 maps Halifax, etc. ....	385 00
Jubilee Road crib, labor and lumber .....	219 86
Power & Co., recovering roof City Hall .....	154 00
Black Bros. & Co., hardware supplies .....	95 19
A. M. Fraser, difference between old and new type- writer .....	92 00
Womersley & Co., 4 national flags, duty, freight ...	57 15
Longard Bros., repairs grate bars City Hall furnaces	51 75
"    "    plumbing supplies .....	40 13
W. S. Craig, plumber's work, police station .....	58 20
C. P. Hill, " " .....	35 00
Farquhar Bros. " and tinsmith work ...	32 25
"    "    1-22 annunciator .....	27 00
John McInnes & Son, lumber .....	59 30
Brookfield Bros., " .....	83 87
Rhodes, Curry & Co., " .....	24 45
Repairs to city sleighs .....	16 95
Jas. Dempster & Co., lumber .....	11 85
John Davison & Son, " .....	6 72
Macdonald & Co., 2 brass plates, etc., City Hall doors	23 40
Cragg Bros. & Co., cleaning material, etc., janitor..	25 05
Summer St. stone shed, taking down same .....	27 30
Whitewashing city fences .....	21 00
Egg Pond, repairs .....	15 69
City Hall flagstaff, painting and paint for same ...	15 40
Holland & Kuhn, framing pictures .....	11 60
McAlpine & Ca., 103 maps City of Halifax, etc. ....	10 75
Registrar of Deeds, fees .....	6 00
Chronicle Publishing Co., advertising .....	5 25
Market Square fountain, repairs .....	3 86
Lawn mower, repairs .....	2 50
Frank Reardon, paint skins, cutting glass .....	3 45
Repairs City Hall furniture .....	9 75
"    "    Clock, Collector's office .....	1 50
Buckley Bros., seed .....	1 13
Gauvin & Gentzel, photograph arch .....	1 25
C. W. Davies, locksmithing .....	1 50
Creighton & Marshall, 2 charts Halifax Harbor ...	1 50
Sundries .....	4 19
T. C. Allen & Co., stationery .....	29 35

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 \$2064 82

Unexpended balance .....

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 \$ 2 27
 

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## Public Baths.

1901.		
May 1.	By Balance brought forward, 1900-01 .....	\$ 737 64
	Chain Rock Beach Bath receipts .....	436 49
	Floating bath receipts .....	40 20
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		\$1214 33

## EXPENDITURE.

*Beach Bath:—*

Salaries, caretakers .....	\$ 119 57
Ungar's Laundry, washing .....	124 44
W. H. Brush, carpenters work .....	61 40
Queen Insurance Co., premium, fire insurance .....	18 00
General work .....	32 26
Removing night soil .....	22 84
Black Bros. & Co., hardware .....	15 25
W. Spiers, 1 row boat .....	8 00
Thos. Mitchell, cab hire .....	7 75
Brookfield Bros., lumber .....	6 48
Kelly & Glassey, 2 bottles brandy .....	2 40
Chas. W. Davies, locksmithing .....	3 90
Stationery .....	2 10
Discount on American money .....	2 00
Mops, brooms, thermometer .....	2 30
Repairing bathing suits .....	1 29
Chloride of lime .....	1 00
Advertising .....	1 00
Army Pay Department, rent of letting .....	25
	<hr/>
	\$432 23

*Floating Bath:—*

W. H. Brush, carpenters work .....	\$ 151 07
T. P. Mulcahy, cooperage work .....	84 25
Salaries, caretaker .....	84 00
S. S. "H. Boyer," towage .....	25 00
S. S. "Goliah," " .....	15 00
General work .....	25 59
Black Bros. & Co., hardware .....	8 68
Ungar's Laundry, washing .....	3 66
T. C. Allen & Co., stationery .....	6 40
Thos. Mitchell, cab hire .....	7 00
Queen Fire Insurance Co., premium .....	18 00
Chas. W. Davies, locksmithing .....	2 00
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	\$430 65

\$ 862 88

Balance carried forward, 1902-05..... \$ 351 45

Beach Bath	{ Receipts ... \$436 49	Floating Bath	{ Expenses ... \$430 65
	{ Expenses ... 432 23		{ Receipts ... 40 20
	Profit ... <u>\$ 4 26</u>		Loss ... <u>\$390 45</u>

## Fire Insurance.

Insured in Acadia Fire Insurance Co.	} in each office.
Halifax	
Ottawa	
Anglo American	

1901.			
May 1.	By appropriation		\$ 800 00
	City Hall	Prem. on \$30000 @ 54c.	\$ 162 00
	“ furniture & fittings	“ 10000 @ 54c.	54 00
	“ Prison	“ 5000 @ 90c.	45 00
	“ “ outbuildings	“ 3000 @ 90c.	27 00
	Infectious Disease Hospital	“ 5000 @ 1 35..	67 50
	Small Pox Hospital	“ 500 @ 90c.	4 50
	Exhibition Skating Rink,		
	Tower Road	“ 2000 @ 1 80..	36 00
	Machinery Hall	“ 1500 @ 1 80..	27 00
	“ contents	“ 8600 @ 1 80..	154 80
	City Stables, Exhibition		
	Grounds	“ 1000 @ 1 80..	18 00
	City Stables, contents	“ 2500 @ 1 80..	45 00
	West St. Engine House	“ 4000 @ 45c.	18 00
	Ladder House, Grafton St.	“ 1000 @ 82c.	8 20
	Central Engine House	“ 2000 @ 54c.	10 80
	Gerrish St.	“ 1000 @ 2 25..	22 50
	Queen St.	“ 1800 @ 45c.	8 10
	Quinpool Rd.	“ 2500 @ 45c.	11 25
	Isleville	“ 1000 @ 45c.	4 50
	Spring Garden Rd. Engine		
	House	“ 1000 @ 45c.	4 50
	Keepers House, Spruce Hill		
	Lake	“ 500 @ 70c.	3 50
	Keepers House, Chain Lakes	“ 500 @ 70c.	3 50
	“ Long Lake.	“ 500 @ 70c.	3 50
		\$84900	\$ 741 45
	Blackadar Bros., advertising		3 14
	Chronicle Pub. Co., “		2 66
			<u>747 25</u>
	Unexpended balance		<u>\$ 52 75</u>

## Young Avenue Sewer.

			Labor.	Material.	Total cost.
Young Avenue, Sec. from Atlantic St. to Inglis St.			\$1796 42	\$ 840 38	\$2636 80
"	"	Owen St.	3836 95	2159 68	5996 63
"	"	Owen St.	3278 17	1473 46	4751 63
Atlantic St.	"	Owen St.	4855 09	2263 10	7118 19
Plover St.	"	Owen St.	3796 75	2741 53	6538 28
Owen St.	"	Owen St.	1801 92	1248 98	3050 90
View St.	"	Owen St.	2296 67	1528 40	3825 07
Outlet	"	Harbor.	1644 38	3127 69	4771 98
			\$23306 35	\$15383 13	\$38689 48

Young Avenue account . . . . . \$23362 19  
 Material etc., not transferred from Sewerage . . . . . 15327 29

\$38689 48

## Internal Health.

1901.			
May 1.	By Appropriation . . . . .		\$14000 00
1902.			
Apl. 30.	Street Fund, transfer to balance . . . . .		1351 57
	City Treasurer, cash . . . . .		2 00
			<u>\$15353 57</u>

## EXPENDITURE.

Cleaning streets . . . . .	\$ 7887 58
Cleaning catchpits . . . . .	1996 45
Removing ashes to dumps, labor only . . . . .	1546 61
Spreading ashes at dumps . . . . .	506 46
Watering streets . . . . .	748 16
Horses and drivers, transfer on account work done . . . . .	500 00
Geo. Heaman, 1 sprinkler with brake, 1 set attachments . . . . .	385 00
Pumping station, city wharf, building and operating . . . . .	440 70
Removing snow . . . . .	328 75
Wm. Willis, 2 flat waggons per contract . . . . .	267 50
Watering carts, repairs . . . . .	259 41
Geo. Thompson, street cleaners and bass brooms . . . . .	214 00
T. C. Allen & Co., printing ash cards . . . . .	84 00
Halifax Elec. Tram. Co., Ltd, 1 arc light at dumps . . . . .	26 24
Cogswell Park, cleaning . . . . .	17 32
Black Bros. & Co., hardware . . . . .	17 14
Canvass covers for ash carts . . . . .	13 10
Engineer's office, labor . . . . .	10 64
General work . . . . .	11 16
Lumber . . . . .	10 90
Brookfield Bros. & Co, 2 barrels lime and cartage . . . . .	2 45
W. A. Hendry, rent dump to November 1st, 1901 . . . . .	50 00
Estate of late J. M. Geldert, rent premises for watering cart . . . . .	30 00
	<u>\$15353 57</u>

### Cost of Removing Ashes.

Labor .....	\$ 1546 61
City horses .....	3684 80
	<u>\$5231 41</u>

### Street Fund.

Loan as per Acts, 1902 .....	\$ 5000 00
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#### EXPENDITURE.

Streets, transfer .....	\$ 2198 82	
Internal Health, transfer .....	1351 57	
		<u>3550 39</u>
Balance on hand .....		<u>\$1449 61</u>

### Fees, Plumbers' Licenses.

W. S. Craig, 316 Upper Water St. ....	\$ 1 00
Crump & Perrier .....	1 00
Day & Kinsman .....	1 00
Donovan & Brennan .....	1 00
Farquhar Bros. ....	1 00
Hill & Elford, 14 Jacob St. ....	1 00
C. R. Hoben & Co., 152-4 Granville St. ....	10 00
Longard Bros., 212-21 Hollis St. ....	1 00
Magnus & Lownds, 165 Lower Water St. ....	1 00
John E. Myers, 90 Gottingen St. ....	1 00
John McFatrige, Jr., 224 Hollis St. ....	1 00
J. B. Naylor & Son, 22 Spring Gardan Road. ....	1 00
Power & Co., 289-91 Barrington St. ....	1 00
Geo. Rent, 31 Barrington St. ....	1 00
G. A. Wooten & Co., cor. Barrington & Sackville Sts. ....	1 00
Macdonald & Co., Ltd., Barrington St. ....	1 00
F. R. Brown, Wilson's Stove Store, 208 Hollis St. ...	1 00
A. E. Craig, 106 Maynard St., not taken. ....	
	<u>\$ 26 00</u>

### Rents, City Property.

1901.		
May 2.	J. McGrath & Co., rent of field to May 1st, 1901 ...	\$ 50 00
28.	E. Morrison & Co., $\frac{1}{2}$ receipt wharfages city wharf...	12 21
	Deposited with Treasurer .....	<u>\$62 21</u>

### Permanent Pavement.

1901.		
May 1.	By Balance brought forward, 1900-01 .....	\$ 5468 00
	Collections per City Collector.....	675 16
	"    Department City Works.....	92 64
	Transfer for material, etc.....	1152 97
		\$7388 77
	EXPENDITURE.	
	W. D. Yeadon, granite .....	\$ 702 95
	W. Churchill Oastler, 4 pieces castings, crusher, duty, freight.....	174 78
	Labor and truckage.....	2358 72
	Sewerage, transfer for material.....	90 70
	Caritte Patterson Mfg. Co., refined tar.....	544 70
	G. P. Mitchell & Son, asphalt.....	906 63
	James Freda, fresh water sand.....	474 52
	Horses and drivers, transfer for work done.....	157 29
	Streets, transfer for material used.....	88 73
	Hill & Elford, connecting rain conductors.....	66 50
	Black Bros. & Co., spindle, oil, etc.....	19 82
	Labor at crusher.....	292 10
	Ed. Hartnett, stone for crusher.....	239 29
	Coal for crusher.....	98 40
	Hardware, lumber, etc., for crusher.....	26 03
		6241 16
	Credit balance carried forward, 1902-03..	\$1147 61

### Street Lighting.

1901.		
May 1.	By Appropriation .....	\$18500 00
	EXPENDITURE.	
	Halifax Ill. & Motor Co., Ltd., electric lighting....	\$18086 02
	Peoples Heat & Light Co., 3 gas lamps.....	82 50
	T. C. Allen & Co., printing specifications.....	17 50
		18186 02
	Unexpended balance .....	\$ 313 98.

### City, Hall Lighting.

1901.		
May 1.	By Appropriation.....	\$ 725 00
	EXPENDITURE.	
	Halifax Tramway Co., Ltd., electric lighting.....	\$ 632 16
	Peoples Heat & Light Co., gas lighting.....	37 10
		669 26
	Unexpended balance.....	\$ 55 74

### Telephones.

1901.  
May 1. By Appropriation ..... \$ 238 00

#### EXPENDITURE.

City Clerk's Office, 12 months.....	\$	35 00
City Collector's Office, ".....		35 00
City Engineer's Office, ".....		35 00
Aldermen's Room, ".....		25 00
Desk, Mayor's Office, ".....		13 00
Stipendiary's Residence, ".....		25 00
Clerk of Works, ".....		35 00
City Workshop, ".....		35 00
		\$238 00

### Citadel Improvement.

1901.  
May 1. By Balance brought forward, 1900-01 ..... \$ 349 89

#### EXPENDITURE.

Army Pay Department, rent 1 year.....	25	
		25
Balance carried forward, 1902-03.....		\$349 64

### West and Maynard St. Land Purchase.

1901.  
May 1. By Balance brought forward, 1900-01 ..... \$1139 24

### Young Avenue.

1901.  
May 1. By Balance brought forward, 1900-01 ..... \$ 47 86

#### EXPENDITURE.

Transfer to streets.....	\$	33 84
I. C. R. R. freight on 1 box trees.....		3 72
Brown Bros. & Co., shade trees.....		10 30
		\$ 47 86

### Young Avenue House and Land Expropriation.

1901.		
May 1.	By Balance brought forward, 1900-01 .....	<u>\$332 53</u>

### Quinpool Road Widening.

1901.		
May 1.	By Balance brought forward, 1900-01 .....	\$ 195 00

#### EXPENDITURE.

Trustees Oxford St. Church, allowance obtaining money from court.....	15 00
Credit Balance carried forward, 1902-03.	<u>\$180 00</u>

### Esplanade.

1901.		
May 1.	By Appropriation brought forward, 1900-01.....	<u>\$6500 00</u>

### Steam Roller Loan, No. 1.

1901.		
May 1.	By Balance brought forward, 1900-01 .....	\$1236 41
	Transfer from streets .....	46
		<u>\$1236 87</u>

#### EXPENDITURE.

Aveling & Porter, Ltd., new boiler, duty, freight, etc. \$	908 52
Labor .....	299 69
Hardware and machinists work .....	28 66
	<u>\$1236 87</u>
T. Hogan & Co., chgd. streets, boiler work \$	92 75
Machinists work, supplies.....	12 25
Expenditure as above.....	1236 87
Total cost .....	<u>\$1341 87</u>



### Steam Roller No. 2.

1901.		
April 30.	By Loan.....	\$3000 00
	Street Transfer.....	30 07
		\$3030 07

#### EXPENDITURE.

Aveling & Porter, purchase .....	\$ 2460 64	
Custom duty, freight, etc .....	565 93	
Royal Bank Canada, telegram.....	3 50	
	\$ 3030 07	

### Lockman St. Widening.

1901.		
May 1.	By Balance brt. forw'd, 1900-01, carried for'd 1902-03	\$2216 08

### Fuel.

1901.		
May 1.	By Appropriation.....	\$ 850 00

#### EXPENDITURE.

S. Cunard & Co., 1361 $\frac{5}{2}$ $\frac{0}{000}$ tons hard coal, 5 chal.		
Sydney coal .....	\$ 745 00	
Wm. Roche, 2 chal. Sydney coal.....	13 50	
Labor putting in coal and removing ashes.....	53 93	
Horses and drivers, transfer for work done.....	37 20	
	849 63	
Unexpended balance.....		\$0 37

## BALANCE SHEET, 1901-02.

	Appropriations and Collections.	Expenditures.	Dr. Balance.	Cr. Balance.
Water Maintenance.....	\$113405 43	\$68207 29		\$45198 14
Water Construction.....	27788 34	26887 62		900 72
Sewerage.....	42761 44	22716 93		20044 51
Young Avenue Sewer.....		23362 19	\$23362 19	
Streets.....	25442 09	25441 47		62
Internal Health.....	15353 57	15353 57		
Street Lighting.....	18500 00	18186 02		313 98
Permanent Pavement.....	7388 77	6241 16		1147 61
Horses and Drivers.....	6726 44	6719 99		6 45
Esplanade.....	6500 00			6500 00
Lockman St. widening.....	2216 08			2216 08
City Property.....	2067 09	2064 82		2 27
Public Baths.....	1214 33	862 88		351 45
Steam Roller Loan, No. 1.....	1236 87	1236 87		
"    No. 2.....	3030 07	3030 07		
West and Maynard Sts. land purchase.....	1139 24			1139 24
Fuel.....	850 00	849 63		37
Insurance.....	800 00	747 25		52 75
City Hall Lighting.....	725 00	669 26		55 74
Citadel Improvement.....	349 89	25		349 64
Telephones.....	238 00	238 00		
Young Avenue House and Land Expropriation.....	332 53			332 53
Young Avenue.....	47 86	47 86		
Quinpool Road widening.....	195 00	15 00		180 00
Rents City Property.....	62 21			62 21
Plumbers' License Fees.....	26 00			26 00
Street Fund.....	5000 00	3550 39		1449 61
			\$23362 19	\$80329 92
				23362 19
City Treasurer.—Our acct. with him..	\$218270 40	\$275238 13	\$56967 73	\$56967 73
Total paid labor per pay sheets.....			\$ 61379 12	
"    Material, etc.....			68231 18	
"    Through this office.....			\$129610 30	
Collections received through this office.....			\$5480 00	

# CITY ENGINEER'S REPORT.

## CITY WORKS DEPARTMENT.

### CITY WORKS COMMISSION 1901-'02.

JAMES T. HAMILTON, MAYOR, *Chairman.*

ALD. E. W. O'DONNELL,      ALD. SAUL MOSHER.

(ALD. JAS. ADAMS appointed Jan. 24th, 1902, vice MOSHER deceased.)

### OFFICERS.

F. W. W. DOANE, M. CAN., SOC., C. E., CITY ENGINEER.

H. W. JOHNSTON, M. CAN. SOC., C. E., *Assistant City Engineer.*

### WATER WORKS.

EWAN MORRISON.....*Foreman.*

CLAUDE DONOVAN.....*Plumbing Inspector.*

JOHN E. BURNS.....*Water and Meter Inspector.*

J. B. SCRIVEN.....*Work Shop Foreman.*

### STREETS, SEWERS, &c,

JOHN McDONALD.....*Foreman.*

THOMAS SPELMAN.....  $\left\{ \begin{array}{l} \textit{Inspector of Buildings.} \\ \textit{Custodian of City Property.} \end{array} \right.$

### OFFICE.

JAMES J. HOPEWELL....*Clerk of Works.*

MISS MINNIE HUNTER..*Stenographer and Sec. of Commission.*

CITY ENGINEER'S OFFICE, CITY HALL,  
HALIFAX, May 1st, 1902.

*To His Worship the Mayor:—*

SIR,—I have the honor to present the report of the Department of City Works for the civic year ending April 30th, 1902, my eleventh annual report.

Included in this report is a summary of the character and extent of the work performed by the whole department during the past year.

WATER WORKS.

Amt. of funded debt on Water Account .....	\$1,086,000 00
" transferred from Revenue .....	16,000 00
" of debt redeemed by Sinking Fund .....	8,000 00
"       "       "       Premiums on Loans .....	4,073 33
	\$1,114,073 33
Amt. expended to April 30th, 1901 .....	\$1,104,103 59
" expended May 1st, 1901	
to April 30th, 1902 .....	\$26 887 62
" repaid       do       2,783 34	
	24,099 28
" of total cost to date ...	\$1,128,202 87

COST OF MAINTENANCE, 1901-02.

Interest .....	\$48,036 51
Sinking Fund .....	2,000 00
Maintenance of System .....	18,170 78
	\$68,207 29

NEW MAINS, ETC.

There were seven petitions for the extension of main distribution pipes presented to the City Council and four orders passed.

Seven extensions were made, three of which, aggregating 474

feet, were in the High Service district, and four, measuring 2227 feet, Low Service. The total length of pipe laid was 3511 feet, the total now in use being 67.4 miles.

Two hundred and eighty feet of old three inch pipe on Morris Street east of Church Street was taken up and six inch substituted. The old three inch pipe on Summer Street between College and Morris Streets was renewed with six inch pipe.

Five main stop valves and six hydrant valves were placed in position. The total number in use is 763.

Five old hydrants were replaced with improved frost jacket hydrants, four of which have steamer nozzles. One new hydrant was placed in service, making the total 416.

Eighteen hundred and ninety-four feet of pipe was laid for 57 new services and 407 feet of old service pipe was renewed.

The total length of excavation shown by the foreman's returns was 5812 feet or 1.1 miles.

#### CLEANING MAINS.

The High Service main was scraped on July 2nd, September 10th, and October 31st. The Low Service 24 inch main was cleaned on October 29th.

#### CLEARING AND GRUBBING.

The shores of Chain Lakes were cleared of all alders, bushes and weeds and the margin of the lakes thoroughly cleaned. The usual quantity of lime was deposited in the shallows during the hot weather.

#### PRECIPITATION.

In the city rain or snow fell on 195 days during 1901. A heavy rain on April 5-6 raised Long Lake over two feet above the waste weir. On the 24th of June a very heavy thunder storm did considerable damage to the streets. From that date till the middle of August the rain fall was very light, the depth recorded for July being 1.585 inches. The lowest record for this month is 1.059 in 1894, while the average for 31 years is 3.918 inches.

Long Lake overflowed in January, February, March, April, May, June and on one day in July and two days in December. The surface of the lake on September 20th was 4 feet 5½ inches below the waste weir.

Spruce Hill Lake rose to within 4 inches of the waste weir level on June 26th after the heavy rain. On September 20th it was 4 feet 3 inches below the waste weir.

While the precipitation records are most valuable in computing the yield of our watersheds, in order to determine with any degree of accuracy the percentage of rainfall collected and the run off available we must also determine the evaporation from the lake surface.

The area of the lake surface should be obtained accurately and experiments made during every day of the year to ascertain the exact quantity evaporated every day.

#### HIGH SERVICE.

The condition of the supply in this district is about the same as at the beginning of the year. The winter was very mild and there was less waste than usual and complaints were fewer. Petitions for water are presented frequently, but only one extension was ordered during the year, viz: 178 feet on Chebucto Road.

No further steps have been taken to prevent waste beyond the ordinary inspection. In 1900-1901 six meters were put on properties in the High Service district to stop waste and in two of those the consumption was 100,000 gallons a month, while it should not exceed 3000. The placing of meters was stopped and the waste goes on unchecked.

In November, at the request of the Council, a full report on this part of the water system was presented; but has not been dealt with. A copy is appended and the adoption of the recommendations contained therein is respectfully urged.

#### THE FOREMAN

of this branch of the department, Mr. E. Morrison, has attended to his varied duties with his usual zeal, promptness and efficiency, and the city gets the full benefit of his long experience.

Many may not be aware that the calls on the employees of the Water Department are similar to those on the Fire Department. Any call for break, leak or fire must be responded to at any and all times, night or day, Sunday or Monday, hot or cold, in all kinds of weather no matter what the exposure is. We are perhaps slow to recognize the value to our comfort and safety of the men who, occupying humble and often unnoticed positions, do such excellent service with pick, shovel and caulking iron, often involving great discomfort, and always hard manual labor.

#### SEWERS.

The length of new sewers constructed was 4287 feet. The cost of construction varied from \$1.49 per foot for crock sewer on Fawson Street to \$30.44 per foot for Prince Street outfall. The total cost of sewer construction in 1901 was \$26455.66 of which \$8367.53 was assessed on abutting properties.

Complaints had been made by the military authorities that the Prince Street outfall sewer was filling up the dock at King's wharf and the city was requested by the War Department to dredge out the dock.

After considerable correspondence and obtaining estimates of the cost of dredging, the military authorities agreed to waive all claims, provided that the city would extend the Prince Street sewer so that it would discharge below low water. This the city consented to do.

The four feet concrete sewer was already laid to low water mark, the outer portion being laid on a pile foundation supporting a timber floor or grillage. Three rows of piles were driven and the centre row cut off to grade to support eight 12 feet cast iron pipes 4 feet in diameter. Pipes and piles were encased in concrete and fender piles driven at the seaward end of the work to prevent damage by shipping.

▽ The Young Avenue sewer (so called) was completed during the season, the work performed including the Owen St. and View St. sections and the outfall on Ogilvie St. from View St. to the Harbor. The usual concrete block construction was followed until the work reached the seaward side of Pleasant St. From the sea wall to low water mark the sewer was backed with solid concrete. From low

water mark the sewer was extended below lowest tide with 4 feet cast iron pipes surrounded with concrete.

The total cost of Young Avenue Sewer and outlet construction was.....\$35,948 90  
 Of this amount the owners of property on Young Ave.,  
 Atlantic, Plover, Owen and View Streets pay..... 12,925 50

The city pays for the sewer only .....\$23,023 40  
 Or at 4% interest..... 920 93

The amount of taxes collected annually from new houses along the sewer is already considerably more than the interest or upwards of six per cent. on the outlay. Instead of being a burden on the taxpayer the construction of this work is making substantial reduction in the taxes of at least two per cent. on the cost to the city.

Thirteen concrete catchpits were constructed, making a total of 713.

The whole amount appropriated for sewer construction has been borrowed and an Act was passed at the last session of the legislature providing that only \$45,000 more should be expended from the frontage assessments, the balance being paid into the Sinking Fund.

#### HOUSE DRAINS AND PLUMBING.

Eighty-four permits were issued for laying drains.

The Plumbing Inspector reports approval of 226 applications for permission to do plumbing work. The total number of permits issued is 2115. Two hundred and forty-five certificates were granted for work properly performed.

The Board of Plumbing Examiners held six meetings and recommended the renewal of sixteen Master Plumbers' licenses and the granting of two new licenses. They also dealt with the application of twenty-four candidates for registration as Journeyman Plumbers and granted twenty-three Journeymen's Certificates.

#### INTERNAL HEALTH.

The two sprinklers manufactured by George Heaman were



placed in service and a contract was made with Robinson Bros. for teams at \$2.74 per day. A Studebaker sprinkler was purchased and put on one of the old carts to replace the old fashioned sprinkler. It is the intention of the department to abandon all the old sprinklers and refit the carts with the Studebaker pattern.

The iron carts were scraped and painted inside under the supervision of the City Carpenter.

Willoughby Smith secured the contract for supplying seven single teams for street cleaning work at 15 cents per hour.

As stated in the last report, the Department had been experimenting during the winter and at the beginning of the year the City Works Commission decided to release Messrs. Stanhope Brothers from their contract for removal of ashes and garbage and perform the work with City teams and labor. A contract was made with Wm. M. Willis for two flat waggons at \$265.00. The work employed three double teams, covering one ward each day. An extra team was necessary to overtake the work in Ward Two and Ward Five. The removal was made at night during the summer and during the day in winter. Although complaints were occasionally received at first, the work is now being performed much more satisfactorily than it ever was by contract. This, I am informed, is the experience of all cities and the work is seldom performed by contract.

The sleighs for this work were made in the City shops by the Carpenter and Blacksmith, who also made all ordinary repairs on carts and sleighs.

There is an erroneous impression that the City teams spend a great deal of their time in the stable because there is no work for them. The Department owns five double teams. Three of these work six days of the week in winter and six nights of the week in summer removing ashes and garbage. The work is performed every day (or night) regardless of weather conditions. One of the two remaining teams removes ashes and garbage on Tuesdays and Fridays, and whenever the work is heavier than usual. When not employed removing ashes and garbage the fourth and fifth teams sprinkle streets. If the streets are wet from rain falling during the night these teams haul street sweepings. During the winter they are employed hauling coal to City buildings, removing ashes

from the same properties, removing snow from streets, hauling sand, gravel and other supplies, making cinder roads and sidewalks and hauling cinders for the next season's work, besides many smaller services too numerous to mention. In short, the City teams are profitably employed on every working day, and many a piece of work is performed that would not be overtaken without them.

In this connection I regret to record the death of Mr. Thomas Spelman, who has been Superintendent of the teams and stables for years. While Mr. Spelman looked after the horses and carts, the laying out and direction of the work was always performed by Mr. McDonald, Foreman of Streets. After Mr. Spelman's demise Mr. McDonald continued to lay out and direct the work under the supervision of the City Engineer. Dr. Jakeman inspects and attends the horses regularly as before. The condition of the horses, harness and carts is ascertained daily by the City Engineer. The City Storekeeper visits the stables daily, weighs all fodder and bedding delivered and checks bills for same, checks consumption and reports any irregularities. He also follows the street sprinkling teams and reports any failure or neglect to comply with the contract or regulations.

Mr. Spelman was Inspector of Buildings. The law makes the Inspector of Buildings also Caretaker of City Property. After Mr. Spelman's death the City Engineer was appointed Inspector, and is therefore Caretaker of City Property. The City Carpenter, a conscientious and capable official, examines all plans and specifications for new buildings and reports on them before a permit is issued, the system followed being the same as that laid down for the Plumbing Department. He also inspects the work during construction. The same official thoroughly examines all carts, buildings, gear, machines, &c., and nearly all repairs are now made in the City shops, while formerly the greater portion of the work was done outside at jobbing prices. Next year all repairs to City property, except harness, will be performed in the shops under the supervision of the City Carpenter. By making this division of the work it has been carried on without extra expense and a saving of \$1,200 in salary made in addition to the reduction in cost of repairs.

Formerly several of the horses were boarded in livery stables, the remainder being kept in the Old Exhibition horse sheds. During the season a comfortable and convenient stable was con-

structed at the Old Exhibition grounds on College Street and all the horses owned by the Department are stabled there.

The street cleaning work does not give satisfaction, not so much because it is not well done, but because streets are not cleaned often enough. The more important streets are kept fairly clean by means of section men sweeping constantly and the paper cart patrol. All streets on which there is much traffic need sweeping at least once a week; but it is absolutely impossible to clean one hundred miles of City streets, remove snow, ashes and garbage and clean catchpits with our small appropriation and satisfy anyone.

The police are doing good work in preventing carpenters from throwing old shingles, &c., down on the streets when repairing roofs. If the good work is extended and builders compelled to clean up every night all shavings, shingles, roofing pot ashes and refuse, housekeepers, storekeepers and occupants of offices obliged to clean up the paper thrown out in front of their premises, employees of furniture and crockery stores prevented from unpacking goods on the street and allowing excelsior, straw and paper to blow about, and boys prevented from ransacking and overturning barrels containing paper and similar refuse put out for removal, the street when cleaned will be kept clean for a much longer period and the appearance of the City will be correspondingly improved.

Since the City is now removing ashes during the whole year there is one other reprehensible practice that should be stopped, namely, dumping piles of loose ashes on the sidewalk or roadway for removal to blow into the eyes and over the clothing of pedestrians. Further, more or less dust and dirt always remains on the pavement.

#### STREETS.

College Street, formerly Neal Street, was originally laid out from Tower Road to Robie Street. Under the authority of Chapter 61 of the Acts of 1886, the Ladies of the Sacred Heart took possession of that portion from Summer Street to the west end of that part of the street afterwards called Brockley's Lane. The right had been reserved by the City to open the street when required. A petition was received asking for the opening of this street, and the City Council, at a meeting held May 16th, 1901, decided to grant the prayer of the petition.

At the first of the year, in accordance with a resolution of Council, the names Artz Lane, Gray's Lane, Proctor's Lane, Hurd's Lane and Bell's Lane were changed to Artz Street, Gray Street, Proctor Street, Hurd Street and Bell Street. There are many other changes that should be made in the names of our streets to prevent confusion in documents and facilitate delivery of mails and parcels. Appended is a list of the streets where names have been duplicated. If the official plan is ever completed there should be no duplicates among the street names nor more than one name for any street.

The numbering has been done without any regard for method or system except that it runs from south to north and from east to west, the odd numbers being on the east and north sides, and the even numbers on the west and south. In one street number 38 is opposite number 293. In others there are more doors than numbers and  $\frac{1}{4}$ ,  $\frac{1}{2}$  and  $\frac{3}{4}$  are used. In one street there are four sets of numbers; in others no numbers at all; and yet property owners protest against any change.

A system of numbering should be adopted for all streets providing a number for each lot or a fixed length of frontage and carrying the odd and corresponding even numbers together. All numbering should be done by the City and numbering plans made and filed in the City Engineer's office.

For many years a portion of the broken stone for street repairs has been supplied by the Association for the Relief of the Poor, who were thus enabled to give employment during February and March. During recent winters the work has been carried on at the old Exhibition grounds. The location of the sheds at these grounds was objected to for several reasons. It was not desirable that idle men in large numbers should be lounging about the City workshops, as they interfered with the work; the dust from the stone became a nuisance to residents in the neighborhood; the premises became a thoroughfare while stone breaking was in progress; there was double truckage on a large portion of the stone, the field stone being hauled from the north end and hauled back again after being broken; the sheds and pile of stones were an eyesore, and the old sheds were unsuitable and so decayed that it was necessary to put up new ones. After consultation with the representatives of the Poor Association and other charitable organizations the Department decided to erect the new sheds on the City property fronting on Kempt Road, Young Street and Longard Road. The cost of the work was

\$473.81. A contract was made for delivery of stone for breaking at  $1\frac{1}{2}$  cents per bushel. The men, who are all employed by the Poor Association, receive 4 cents per bushel. Interest, wages of foremen, &c., brought the cost to \$2,716.92 for 38,169 bushels broken, or a little more than 7 cents per bushel.

The stone broken at the crusher costs from  $3\frac{3}{4}$  to 4 cents. The price paid for stone supplied by the City Prison was  $3\frac{1}{2}$  cents, which, with the extra haul, makes the cost the same as crusher stone.

In August all the stone on hand had been used and the crusher was started. About 60,000 bushels were broken to complete work ordered.

Late in the season a heavy storm did considerable damage to the retaining wall on the east side of Pleasant Street, below McDougall's distillery. The sea battered down a portion of the wall and carried away the sidewalk. The waves washed over the street, leaving a line of chips, seaweed, &c., on the west side of the roadway.

The steam roller which had been in use since 1891 required a thorough overhauling. A new shaft and boiler had been received from Aveling and Porter, and the roller was taken apart and re-fitted in the City shops. The machine is now as good as new and ready for the season's work.

While the work performed by the roller has revolutionized road-making in Halifax, it has also shown that one machine is not sufficient to overtake the work that should be done each year, and a contract has been made for a second roller. While we shall not require two rollers in service during the whole season, there is no question that a great saving will be effected by having a second roller available when required. With one roller the work is only partially done and in many cases is unsatisfactory, as it is not always practicable to do the street work at such a time that the one roller can overtake the whole of it as soon as it is ready. Broken stone placed on the street, especially along the car track, is often knocked about for some time before the surface can be completed. All the more important roadway repairs should be made early in the season so that the streets may be in good order during the summer. With one roller a great deal of work cannot be com-

pleted till late in the fall when winter is coming on, and much of the benefit that should be received from the expenditure is lost. During the first part of the season, after the frost comes out of the ground, two rollers are absolutely necessary to accomplish the work to be done. Every street that has been affected by the frost should be re-rolled, and it is obvious that, with our great mileage of streets, one roller cannot overtake it. If streets which have been upheaved by frost are rolled as soon as the frost comes out of the ground they will not require repairs, provided there is sufficient wearing material on them, and one day's rolling saves the expenditure of hundreds of dollars.

It is claimed by many would-be roadmakers that our method of applying broken stone is all wrong, that it is a waste of money to "pick up" the road and that the broken stone should be put on in the mud. It is just possible that there may have been some excuse for such work before the day of rollers, but in these days of modern road machinery no road engineer would dream of such a specification. The fundamental principle of roadmaking to-day is drainage. Water must be kept off the road to prevent softening and wear and out of it to prevent softening and frost action. When broken stone is laid on a properly prepared foundation the water getting through the road surface, drains through the interstices of the stone and over the sub-surface to the side of the roadway. Where the broken stone is laid in the mud the latter absorbs and retains the water and the frost does the rest. The results of such work may be seen on many old streets every spring where hundreds of dollars have to be spent to repair the damage from upheaval by frost. The "picking up" enables the new material to bond into and unite with the old, thus preventing the repaired roadway from "ravelling" and the admission of water between the old surface and new metal.

Another mistake made in all of the older streets outside of the business district is the great width allowed for roadway. Sixty feet streets have ten feet sidewalks and forty feet roadways. On many suburban streets, where traffic is light, eighteen feet may be ample for roadway, and thirty feet is sufficient for all streets except those where tramway tracks are laid or likely to be laid. Twenty feet roadways would leave twenty feet sidewalks, at least twenty feet of which (ten feet on each side) could be sodded. The cost of keeping twenty feet of sodding in repair would be practically nothing in comparison with the present cost of keeping up twenty feet of roadway, especially on hills, to say nothing of the improved

appearance of the street where the sodding is used. In this connection it is pleasing to note the tendency of late in some parts of the City to abolish the ugly, high board fence and substitute low, open railings, exposing green, well kept lawns, neatly trimmed gravelled walks, handsome beds of flowers, shrubs and occasionally hedges.

The attention of the Council should be directed to the danger of serious, and perhaps fatal, accidents at railway grade crossings, particularly at the slaughter house, on Campbell Road. Drivers of teams approaching this crossing cannot see a south bound train until it is upon them. It would be advisable to depress the road at this point so that all traffic on the street would pass under the track. Retaining walls would be required, but the drainage of the road would not be affected by the change. We should not wait for a fatal accident before urging the necessity for this alteration.

#### STREET FUND.

The Works Department have been embarrassed every year by lack of funds during the winter and early spring. The working season closes about the first of December, and as long as there is money in the appropriation it is impossible to retain the amount required to provide material for the next season's work and commence repairs as soon as the frost is out of the ground. There is so much work to do and so small an appropriation to do it with that the fund is exhausted by the time the cold weather comes. It is necessary to provide the quantity of broken stone required for the season's work before the beginning of the civic year. In the past part of the money for this work has been provided by the Poor Association by borrowing at the bank. At the last session of the Legislature an Act was passed creating a fund of \$5,000, to be placed in a chartered bank, and drawn from only between January 1st and May 1st, the amount drawn to be repaid each year from the Street Appropriation.

#### ELECTRIC LIGHTING.

The Halifax Electric Tramway Company, under the provisions of their Charter, acquired the rights and franchise of the Halifax Illuminating and Motor Company and have been lighting the city ever since. The rate paid for 2,000 c. p. direct current open arcs was \$78.75, and for incandescent light 15 cents per kilowatt hour.

During the last two or three years a committee of the Council has had the lighting problem under consideration. They obtained prices and options on various sites, had plans and specifications prepared in this office for steam plants, gas engine plants and Dowson gas plants; obtained tenders for wharves, buildings, machinery, line construction, &c., and investigated into the most improved system of lighting.

At a meeting of the Council on April 26th, 1900, the committee reported recommending that the city purchase land, erect buildings and install a municipal plant. That report reposed on the Order Paper for nearly a year, when the Council on February 8th, 1901, passed the following resolution :

“ Resolved, That the recommendation of the committee that the city erect a plant and do its own lighting be adopted and that the special committee be asked to select a site before tenders are asked for and report to the Council not later than a month hence.”

The committee recommended the Tully property on the shore of the Basin near Africville; but the Council instructed the City Works Commission to ascertain the rate at which the Halifax Electric Tramway Company would make a contract for a short term of years. The Works Commission obtained a tender for \$65.00 a year for series alternating enclosed arc lamps and a meter rate for buildings of 10 cents per kilowatt hour. At the meeting held July 23rd, 1901, this tender was accepted for a five year contract. Subsequently a contract was signed, to come into operation July 1st, 1902.

#### CITY PROPERTY.

Work in this service included renewal of the gravel roof on the City Hall, for which Power & Co. were awarded the contract.

A new pier was constructed at the west end of Jubilee Road, the old one having almost disappeared.

The lowest tender received was Reid & Archibald's, \$295.00. The Commission decided to do the work by day's work under the City Carpenter. The cost was :



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Material.....	\$113 32
Labor.....	111 96
Cartage.....	5 60
Total.....	\$230 88

## CABLE CONDUITS.

The Nova Scotia Telephone Company obtained permission from the Council to lay underground conduits for their wires in Granville Street between Sackville Street and Buckingham Street, and in Spring Garden Road between Pleasant Street and Tower Road. They will perform the work during the coming season.

## BATHS.

The Baths were opened July 2nd. The number of bathers at the Floating Bath was 7,205 and the receipts \$40.20. The expenditure in connection with this Bath was \$415.90.

At the Beach Bath there were 10,914 bathers. The receipts were \$436.49 and expenditure \$415.28.

The figures tell their own tale. The Floating Bath is not losing patronage, as the statement following will show; but the location is not an ideal one. The water is colder than at the Beach and bathers prefer open air and sunshine, the cleaner water of the Arm, and many of them a dive and longer swim than can be obtained in the Floating Bath. The number of bathers at the Floating Bath includes a much larger percentage of children than in former years.

## FLOATING BATH.

Year.	Opened.	Closed.	No. of BATHERS.			Receipts.	Expenditure.
			Male.	Female.	Total.		
1898	July 14..	Sept. 15..	.....	.....	12620	\$127 25	\$110 98
1899	June 21..	" 19..	5478	1662	7140	61 00	707 66
1900	July 2..	" 24..	4997	1317	6314	56 95	427 69
1901	" 1..	" 17..	5649	1556	7205	40 20	430 65

## CHAIN BATTERY BEACH BATH.

Year.	Opened.	Closed.	No. of BATHERS.			Receipts.	Expenditure.
			Male.	Female.	Total.		
1898	Aug. 2..	Sept. 15..	.....	.....	9803	\$276 60	\$146 26
1899	June 21..	" 30..	8772	3172	11944	366 05	999 34
1900	July 2..	" 30..	8281	2721	11002	353 10	461 96
1901	" 1..	" 23..	8149	2765	10914	436 49	432 23

## OFFICIAL PLAN.

No work was done during the year on the city plan or surveys. An appropriation was made and an engineer nominated to do the work; but the council declined to employ him and he engaged with the Town of Sydney for similar work. It is unwise to delay this work as the amount of information in this office regarding the physical particulars of the streets is very limited. We should have plans and books showing at a glance the grade, elevation of roadway, curbs and sidewalks, width of roadway and sidewalks, kind of roadway, sidewalks and curbs, position of sewer, water pipes, gas pipes, conduits, cables, valves, manholes, crossings, house drains, poles, lamp posts, hatches, coal holes and all other structures in the street.

While we have great difficulty in determining street lines another obstacle in the way of street improvement is the absence of a general plan of levels showing the modifications required in the profile of streets. For want of fixed levels, property owners are left to their own judgment in the selection of levels for their buildings and they generally follow the accidents of the land. When the streets have to be drained, paved or otherwise improved the gradients of the pavement, curbstone and sidewalk have to be made to conform to the zigzags of existing constructions, the grade of sewer is often rendered insufficient or difficult to obtain at all for want of system in the grading of streets.

A general profile or grade of all streets should be established, approved and enforced. In establishing these grades the general line of the scheme should be laid with a view to perfecting the levels of the street so as to conform to a complete system of drainage having continued gradients converging towards a common point. In the execution of this plan the streets should be brought up to the general lines as much as possible on streets already built and absolutely in unimproved streets. In new streets the grading to proper levels would entail considerable expense and in such cases the cost of the improvement should be assessed on the property owners benefitted. Cast iron plates imbedded in the walls of permanent buildings or similar marks indicating the lines and levels of streets would greatly facilitate the adoption of such lines and levels.

#### DEPARTMENTAL WORK.

This Department has been administered during the year with an eye solely to economy and efficiency. It is one of the most difficult branches of the city government to administer; the main trouble has been in trying to conduct the work of the Department with its ever extending necessities upon inadequate appropriations. The sums appropriated for some branches of the work are manifestly insufficient for absolutely necessary expenses, to say nothing of satisfying the public.

The rate of wages for a ten hour day for laborers was formerly \$1.10. When the day was changed to nine hours the wages remained unaltered. In May, 1900, the Council made the minimum rate of wages for laborers 14 cents an hour.

Since my first Annual Report considerable saving has been effected in the total amount paid yearly to officials. The salaries paid in the Engineer's office are \$480.00 less than in 1891. The staff in the Clerk's office at that time paid \$1,500.00 (\$900 and \$600) now receives \$1,650.00 (\$1,100.00 and \$550.00), an increase of \$150.00. An increase of \$316.00 has also been made in the salaries of foremen. Besides the reduction in the Engineer's office the working staff has been reduced by death, resignation or removal, as follows: City Plumber, \$676.00; Caretaker Old Exhibition building and Carpenter, \$364.00; Water Inspector, \$624.00; Water Works Sub-Foreman, \$520.00; Building Inspector and Caretaker of City Property, \$1,200.00. Total increase \$466.00; total reduction \$3,864.00; net reduction \$3,398.00. None of these vacancies have been filled and the work has been performed by other officials already in the service without impairing the efficiency of the Department.

Respectfully submitted,

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

# REPORT ON WATER SUPPLY SYSTEM.

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CITY ENGINEER'S OFFICE,

HALIFAX, N. S., Nov. 26th, 1901.

*His Worship the Mayor:*

SIR,—In accordance with the request of the City Council, I beg to submit a report on the City Water Supply.

Before dealing with the present inefficiency of the service, a brief review of the history of the system may help those members of the Council who are not familiar with the works to understand the question better.

The original works were constructed by a private company, and the water was first turned on from Chain Lakes in 1847. The population at that time was estimated at from 20,000 to 25,000, and a 12-inch main estimated to deliver 700,000 gallons a day was laid.

In 1854 an additional 15-inch main was laid to meet the rapidly increasing demand. Danger level in the lakes and inadequate supply lead to the purchase of the Water Works by the city in 1861 for £56,000.

In 1862 the 12-inch main was taken up and a 24-inch pipe laid instead from Chain Lakes via Quinpool Road to the city.

Upper and Lower Chain Lakes and Long Lake which flows into them, supply the water to feed this main. They are now all at the same level, and when full are 206 feet above the level of the sea. It is scarcely necessary to state that if no water were drawn from the pipes and they were allowed to fill as high as the water would flow it would rise in the city until it reached the same level as Chain Lakes from which it started. However, in consequence of the water being drawn from the pipes constantly, the friction in the pipes, bends, &c., and the roughness of the interior caused by the corrosion of the iron, water from Chain Lakes will not rise

higher than the southern portion of Creighton Street, Tower Road and other streets on that level.

A large portion of the city is above that level, and in 1868 water was brought from Spruce Hill Lakes, the highest lakes of any size in the vicinity, to supply the higher district now known as the high service.

The high service and the low service are two distinct water supplies, and are separated as completely as if they supplied two different towns. At the same time, they are controlled by valves, which enable us to turn the high service water and pressure into the low service pipes when required temporarily for fire fighting.

In 1893 a second low service main was laid from Chain Lakes to the north end of the city, the distribution branching from the junction of Gottingen and Kaye Streets eastwardly and southwardly through the low service district. The two mains are capable of supplying twice the quantity of water that the old 24-inch main could deliver.

A statement was made in the Council that the second main does not bring in any water, and that when the water is turned off the old 24-inch main, the whole low service supply is turned-off. Such careless and incorrect statements should not be allowed to go to the insurance companies unchallenged. The low service supply has not been turned off from the city for one instant during the past eight years. As previously stated, the level of Chain Lakes when full is 206 feet above the sea. The highest point in the grade of the north end main at Kaye street is 171 feet above sea level. The difference or head of 35 feet would be equal to 15 pounds pressure (not allowing for friction, &c.), but with the heavy draught the water will not rise above the pipe. When the 24-inch south end main is turned off, the north end main can and does supply the whole low service district, except a few of the higher streets, such as Creighton Street, Tower Road, Spring Garden Road and Fort Massey. When the north end main is turned off and the whole low service district is supplied from the south end main the same streets are without water.

While the low service system is more efficient than the high service its condition is far from satisfactory.

The 24-inch main had a capacity when new of about  $5\frac{1}{4}$  million gallons a day and Mr. E. H. Keating estimated that at least four million gallons a day were delivered through that pipe alone. The capacity of the new main is equal to that of the old one, so that the two can deliver at least 8,000,000 gallons a day, or 200 gallons per head of the population. When it is remembered that the whole city is not supplied from the low service we must conclude that the capacity of the mains is ample for all legitimate requirements.

Providence, R. I, a city which requires a large quantity of water for manufacturing purposes, uses 84 gallons per head. Fall River, another manufacturing city of 102,281, uses 3,477,554 gallons a day. We have no large manufacturing works except the sugar refinery on the low service, and they use 110,000 gallons a day. We must therefore be using more than we need, and while it may be that the house supply is not very bad the enormous consumption reduces the fire pressure.

There is little doubt in my mind that underground leaks are responsible for a portion of the heavy consumption, and a systematic inspection and examination of the whole low service system should be made to discover the escape of water which gets away unobserved in old drains and rock trenches. The expenditure involved will be considerable, but in my opinion would result in a corresponding improvement, as much of the old work is wooden joints, which fail as the wood gets bad.

The time will come, if it has not already arrived, when a distributing reservoir will be needed for the low service. The draught at ordinary times is greatest during the day, and when the mains are overworked a distributing reservoir equalizes the pressure and supplies the extra demand, the water drawn off during heavy draught being replaced in the hours of lighter consumption.

The water used by the Sugar Refinery seriously affects the condition of the system in the north end during the day, and they should be obliged to provide a reservoir on their own premises of sufficient capacity to contain at least one day's supply. They could fill it at night and thus prevent the draining of the main pipe on Campbell Road during the day, which is unavoidable with the present plan of supply.

The most important remedy, however, for inefficiency in the low

service is reduction in the amount unnecessarily consumed. We cannot hope to reduce it to the limits attained in English towns but there is no reason why we cannot equal the reduction made in Providence, Fall River, and other American cities, by adopting the same remedies as they use and rigidly enforcing them without fear or favor.

The High Service System is in a most unsatisfactory condition, and complaints are frequent and vigorous. During the heat of summer and the cold of winter so much water is consumed that the pipes in the highest part of the district cannot fill. While water users on the lower levels get an ordinary household supply, they are unable to use hose as they could a few years ago, and so much water is drawn from the mains that the supply at times fails entirely in the higher levels.

The first remedy that naturally suggests itself is a larger pipe or a second pipe to bring in more water, and if the necessary quantity of water were available there is no doubt that a new pipe would have been laid long ago.

Mr. Thomas C. Keefer, C. E., C. M. G., a Hydraulic Engineer of the highest standing, reported on the capacity of Spruce Hill Lakes and the supply main as follows:—

“The 15-inch pipe extended within one mile of the Spruce Hill Lakes and then connected with a 20-inch one for the level mile leading out from the Lake, will deliver two millions of gallons at the highest levels in the city and three millions per diem at a level 100 feet above tide, or at the lower line of the high district.”

After giving figures and calculations in support of his assertions Mr. Keefer says further:—

“I am of opinion that the Spruce Hill Lakes may be relied on for a daily supply of at least one million of gallons in the driest years, and that in wet years this quantity could be doubled. As an average the rainfall should give from the area one and a half million gallons daily supply.”

He then gives the capacity of the pipe in gallons per minute and day in detail, and proceeds:—

“This quantity two million gallons, which the 15-inch pipe is



able to pass is greater than the estimated average supply, but it is none the less desirable that the pipe should be arranged for the greatest efficiency throughout."

Mr. E. H. Keating, who enjoys a well-earned reputation as a hydraulic engineer, had the supervision of our water works system for nineteen years.

In a report during his term of office as City Engineer, Mr. Keating said in reference to Mr. Keefer's statements—"So far nothing has been ascertained to disprove the correctness of his calculations."

In his annual report for 1887-8, Mr. Keating says: "The Spruce Hill Lakes, which furnish the supply to the High Service, are now drawn upon to their full capacity, and unless some means are adopted to check the lavish consumption and waste on this service, and extensions from it to districts to which it never was intended to be conveyed, the Lakes cannot be relied upon to hold or furnish sufficient water to meet the demands made upon them. In any dry season the supply might, and probably would, be exhausted."

In 1889, Mr. Keating again reported—"These Lakes are now drawn upon nearly to their full capacity, and will not stand further demands being made upon them for water without running the risk of exhausting the supply from that source during seasons of long continuous dry weather."

In 1890, his last year on the Water Works, he said:—"The Spruce Hill Lakes which furnish the supply to the High Service, are drawn upon to their full capacity. so that for a couple of years the water has never risen to the waste weir level, although previously the lakes overflowed in the rainy seasons."

Since that date 47029 feet or 9 miles of water pipe has been laid in the High Service district.

In 1891 steps were taken to raise the dams and stop timbers were placed on the waste weir to hold the water if it should rise above it. The water now must run eighteen inches over the stone waste weir before any water is lost. From 1891 to 1896 the lake did not fill up. In 1896 we had the heaviest rainfall ever recorded in Halifax yet the lake filled up only to one-half inch above the timbers

Since that year it has flowed over the stone waste weir, but the water does not escape and the lake does not overflow. We now store all the water that can be collected on the Spruce Hill Lake water shed and there are no higher lakes in the neighborhood. There is no lower supply available of sufficient size to justify the installation of a pumping plant.

It has been stated by a Member of Council that Spruce Hill Lake could be drawn down for city supply for a depth of fourteen feet. If you measure from the floor of the gate house down to the pipe you may get a depth of fourteen feet, but that pipe is laid as low as possible to get a solid foundation and to place it out of the reach of frost after it leaves the gate house. The lake could be drawn down ten feet, exposing the pipe, drying the lake at the dam and leaving a mud puddle in the centre, but when we got it down to that, if we did not get a heavy rainstorm there would be a water famine. It would be madness to use all the water in the lake and leave no surplus storage for a following dry year, for we know from long experience that we do not collect as much water in a dry year as we use, and if we did not store the surplus water that falls in the wet years we should not have enough to supply the High Service district through a dry season. Further, the quality of the water would be seriously impaired by vegetable growths in the exposed shallows, the presence of immense numbers of those minute organisms which infest shallow water, the injurious effect of the sun, and the impossibility of allowing the water to remain quiet long enough to permit the sediment and impurities to fall to the bottom before the water is used. Although this season has been a dry one, the average rainfall will not be low as we have had heavy storms. At the same time an inspection of Spruce Hill Lakes to-day will show that a large portion of the surface is dry and there is scarcely more than one foot of water flowing in the narrow trench between the two lakes.

A distributing reservoir or stand pipe has been suggested, and if there were a constant supply, or if the consumption were reduced, I would recommend it. It is useless, however, to think of it until the drain on the main is relieved. Frequently in winter, water will not go to the highest streets either in day or night. To be effective, a reservoir must be higher than the highest streets. If water will not rise to the high streets now it could not run into a reservoir. If it could be kept full a reservoir would not only equalize the pressure and improve the supply during heavy consumption, but if of suf-

ficient capacity it would furnish a supply during the cleaning of the mains or when water is turned off for repairs, &c.

Pumping to a reservoir has been suggested. We cannot pump from the High Service because we cannot take any more water without ruining the service already bad. Pumping from the mains would not only rob the present meagre supply but would empty pipes all over the City in cold weather, causing much damage and inconvenience by frost. We have some surplus in the Low Service lakes, but it will be needed as the district is extended, and the lakes will store now the whole rainfall of the dryest years. In wet seasons the quantity of water drawn from Long Lake could be doubled without exhausting the supply. In the dryest seasons our surplus is limited. The records show that only 250,600,000 gallons ran to waste from Long Lake waste weir in the dryest year, an average of 700,000 gallons a day. This water could be saved in storage if required by putting stop timbers on the waste weir. Pumping from Chain Lakes should be adopted only as a last resort.

Cleaning the mains affords a temporary benefit and we are scraping them three times a year. We are injuring the pipe in doing this work so often and it should not be continued.

If it were absolutely necessary we should be obliged to bring water from a new source in large pipes. This would mean an increase in taxes and consequently more burden on the ratepayers. New rates pay only for the distribution and would not pay the interest on the cost of new supply. The balance remaining after the interest and cost of maintenance is paid each year leaves no room for large capital expenditure.

An intermediate system should be carefully considered before deciding upon heavy expenditure for new work. It may be possible to establish such a system by using Ragged Lake and establishing a new reservoir in the higher portions of the Long Lake watershed below Spruce Hill Lakes to catch part of the rainfall on these gathering grounds before it runs into Long Lake. Surveys and studies would be required before the feasibility of such a scheme could be determined. If a suitable reservoir site could be obtained and the necessary quantity of water impounded at sufficient height to supply the lower portion of the High Service the district could be divided and a new pipe—a intermediate service main—laid to supply the lower portion while the present High Service main would

give a better supply than at present to the higher portions. If such a plan were adopted it would be necessary to alter the distributing pipe system in the city.

The whole cost would be probably not less than \$200,000 to \$250,000, at least \$8000 to \$10,000 a year increase in water taxes. There is sufficient surplus in the Long Lake water shed at present to supply an intermediate system, but at the present rate of increase in consumption it will not be long before we shall need all the water that can be collected from these gathering grounds for the Low Service district alone. Further, in my judgment, for one-tenth of that expenditure other means can be provided that will effect a remedy.

If our present supply were insufficient for our legitimate needs we should be obliged to make a heavy expenditure for additional supply. But first let us again consult Mr. Keating. His opinion on this question is on record, and should carry great weight as he studied the matter thoroughly for years.

In his first report in reference to this subject he says:—"It is needless for me to say much on the evils attendant upon the profligate waste, as I am aware that you are already well informed on the subject; but this I would say, that it is quite practicable to put a stop to the great bulk of it, though probably it will be found a difficult and tedious undertaking. Stringent laws of course will be required, but they have become a necessity, that is, unless the City is contented to tolerate such a state of things and to tax itself with the cost of increasing the extent of the works, which is most unnecessary."

"There will be found little use in cautioning people against the extravagant waste of water, or even in adopting the more arbitrary measures of turning off and exacting a fine in the case of offenders. The real causes of the evil lie in the insufficient depth of service pipes; the careless manner in which the plumbing is arranged; the cheap style of building—little better than mere shells,—which have long since become prevalent amongst us; the cold and exposed positions in which pipes are laid; and the unprotected state of the pipes everywhere. So long as these things are allowed to continue unchecked, great waste must take place. No householder will be foolish enough, even at the risk of having to pay a paltry fine, to stop a tap from running when he knows the inevitable results will

be a burst pipe, his house inundated, and a heavy bill for repairs as well ; besides all the attendant annoyance, discomfort and misery."

In a later report Mr. Keating said :—" All this is owing to the extravagant waste of water which takes place throughout the city both in summer and winter, but the evil effects are most severely felt during the winter months, because the waste is then general, continuous and unchecked. While this state of things is allowed to continue it is useless to complain of the low pressure or for citizens to expect the water to rise to the upper stories of their houses. When a fire now breaks out, one of the first things requiring attention is to concentrate the water as much as possible to that locality by shutting it off from other parts of the city, and in this way the pressure can generally, in a short time, be run up to a satisfactory height. It is perhaps needless for me to say that this expedient would in most cases be unnecessary if the waste of water were stopped ; and if not stopped, the majority of the citizens must be prepared before very long not only to submit to a short supply, but to increased rates of insurance, which will be the probable result."

In his last general report on this trouble Mr. Keating states that " The cause of the whole trouble and of the unsatisfactory condition of the water works is due to the lack of proper system in controlling the consumption and waste of water in the city, and until this is recognized, and stringent measures for the suppression of the extravagant use and waste of water are adopted and firmly enforced, without fear or favor, no improvement in the general supply within the city can be expected, no matter what amount of money may be expended in perfecting the head works or improving the principle reservoirs from whence the supply is drawn. In fact matters will continue to grow worse and more unsatisfactory yearly."

It must be admitted that the prediction of our former City Engineer was only too true. I believe, however, with Mr. Keating, that it is practicable to stop the great bulk of the waste.

I have not recommended any extensions on the High Service for some time, as I am convinced that it would further weaken the system and cut off the water from many who now get it. I have not changed my opinion as to the proper remedy to adopt, but as the Council have not agreed with me, in order to comply with the petitions of property owners as far as possible, I think I would be justified in recommending such extensions as are urgently required, if the following recommendations were adopted by the Council :—

1. That the present one-sided meter law shall be amended so that premises on which meters are placed shall not be charged more than the minimum water rate, unless the quantity of water consumed would amount to more than that sum.

2. No extension shall be made in the high service for new supply except through meters.

3. In future a meter shall be placed on each new service pipe in the high service district before water is turned on and the City Works Commission authorized and instructed to purchase meters as they are required for carrying out these recommendations.

4. That the City Engineer be authorized and instructed to place a meter on the pipe supplying any property where waste has not been stopped on second inspection, provided that notice to stop waste is served on the owner or agent after first inspection.

Our experience with inspection shows that in bad cases all benefit ceases as soon as the Inspector leaves the premises. The meter has been most successful as a silent inspector, and three instances previously reported are sufficient to prove its ability as a waste reducer. The quantity of water used at a south end wharf was reduced by the meter from 1,400,000 gallons the first month to 12,000 the second month. A stable using 40,000 gallons the first month got along very comfortably on 4,000 gallons after the first meter reading. A property owner on Cornwallis street received a bill for \$126.00 for the first six months. The quantity consumed in the next six months cost \$2.00.

I have endeavored to make this report as brief as possible, and trust that it may contain some information that will lead to a better understanding of the situation.

Respectfully submitted,

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

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REPORT FOREMAN WATER DEPARTMENT.

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CITY HALL Halifax, N. S., May 1, 1902,

F. W. W. DOANE, ESQ.,

*City Engineer.*

DEAR SIR,—

I have prepared the annual report of stock belonging to the Water Department and length of main and service pipes laid, with length of pipes re-cleaned, also location of houses supplied with water during summer of 1901 ; all which is herewith

Respectfully submitted,

E. MORRISON,

*Foreman Water Department.*

## WATER MAINS, 1901-1902.

STREETS.			CAST IRON MAIN PIPE.			HYD'TS.		COST PER FOOT IN CENTS.						Total Cost.								
IN	FROM	To	High or Low Service.	3 inch Pipe—feet.	4 inch Pipe—feet.	6 inch Pipe—feet.	Joints.	Number of Valves.	Length of Pipe—feet	Size of Pipe—Inches.	Number.	Number of Valves.	Percentage of Rock.		Pipes and Specials.	Valves and Hydrants.	Labor and Cartage.	Lead, Gasket, &c.	Dynamite and Fuse.	Incidentals.	Total.	
														College								Exhibition Gate
Williams	End of Pipe	Windsor	H		164		"	1						40.4	9.8	29.1	3.8				80.1	131 42
Plover	End of Pipe	Owen	L		630		"	1						60.9	3.2	15.7	0.9	0.2			80.9	509 98
Owen	End of Pipe	Plover	L		646		"	1						61.3	3.1	60.3	0.2	2.9			127.8	825 18
North	E. of Pipe W. of Windsor	132 feet west	H		132		"							60.0		161.1	1.5	8.7			231.3	305 33
Summer	College	Morris	H		530		"	1						62.0	3.8	66.4	1.4				133.6	708 03
Morris	Church	280 feet east	L		280		"							66.5		93.6	2.1				162.2	454 19
Chebucto Rd.	Windsor	178 feet west	H		178		"	1						61.6	11.2	19.4	2.2				94.4	168 11
H. M. Dockard	N. E. Drill Ground	Cable House	L		825		"	2													141.7	1168 90



## STREET MAINS REPLACED WITH LARGER MAINS, 1901.

STREET.			SIZE IN INCHES.		LENGTH IN FEET
In	From	To	Old Pipe.	New Pipe.	
Summer Street	College Street..	Morris Street....	3"	6"	530 feet.
Morris Street..	Church Street..	East .....	3"	6"	280 feet.

### Total Length in Feet of Cast Iron Water Mains in the Water Supply Sys'em of the City of Halifax.

	SIZE OF PIPE IN INCHES.										Less than 3 in.	Total.
	27	24	20	15	12	9	8	6	4	3		
Length April 30th, 1901.....	14560	20524	6712	44236	37201	42401	415	125518	19593	†46338	898	†358396
Laid during 1901-92.....	.....	.....	.....	.....	.....	.....	.....	3347	164	.....	.....	3511
	14560	20524	6712	44236	37201	42401	415	128865	19757	*45508	898	*361077

Equal to 68 2037-5250 miles.

†Mistake in last report.

\*280 feet taken up on Morris Street and 550 feet on Summer Street.

N. B.—45 feet of 20 inch pipe in waste way Chain Lakes and pipes from mains to hydrants (except wharves) laid previous to 1897 not included in above summary.

## Pipes Cleaned by Mechanical Scrapers, 1901.

DATE.	LOCATION.	Diameter in inches.	Length cleaned in feet.	COST.	REMARKS.
1901.					
July 2...	High Service Main.....	20	6712 )	\$22 39	Re-cleaned.
" 2...	" " .....	15	29628 }		"
Sept. 10...	" " .....	20	6712 )	17 06	"
" 10...	" " .....	15	29628 }		"
Oct. 31...	" " .....	20	6712 )	22 46	"
" 31...	" " .....	15	29628 }		"
" 29 ..	Low Service Main.....	24	13400	22 60	"

## New Service Pipes, 1901.

$\frac{1}{2}$ inch. Feet.	$\frac{3}{4}$ inch. Feet.	1 inch. Feet.	$1\frac{1}{4}$ inch. Feet.	$1\frac{1}{2}$ inch. Feet.	Total Feet.
1654	.....	177	43	20	1894

## House Services Renewed, 1901.

$\frac{1}{2}$ inch. Feet.	$\frac{3}{4}$ inch. Feet.	1 inch. Feet.	$1\frac{1}{4}$ inch. Feet.	$1\frac{1}{2}$ inch. Feet.	Total Feet.
334	35	38	.....	.....	407