OFFICIAL DOCUMENT.

ANNUAL REPORT

OF THE

SUPERINTENDENT

OF

Water Works,

OF THE

CITY OF PITTSBURGH,

FOR

YEAR ENDING, JANUARY 31,

1881.

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FOR THE

YEAR ENDING JANUARY 31ST. 1881.

No. 116, in S. C., May 9th, 1881. Received, and 300 copies ordered printed.

GEO. BOOTH, *Clerk.*

In C. C., June 1st, 1881. Action of Select Council concurred in.

CHAS. W. HOUSTON, *Clerk.*

PITTSBURGH:
PRESS OF BEST & COMPANY, No. 91 FOURTH AVENUE.
1881.

JAMES M. ATKINSON,
Superintendent of Water Works.

C. B. BOSTWICK,
Assessor of Water Rents.

GEORGE H. TAYLOR,
Clerk of Water Committee.

Superintendent's Report.

To the Honorable Chairman and Members of the Water Committee of Select and Common Councils of the City of Pittsburgh:

GENTLEMEN:—In compliance with the ordinance governing this Department, I hereby report the condition of the Water Works for the year ending January 31st, 1881; also, the expenditures, with such information and suggestions as may be required.

WORKS, CORNER TWELFTH AND ETNA STREETS.

These works are in as good condition as could be expected, as they are very old and almost worn out. They were condemned in the year 1869, but nevertheless have been running to their utmost capacity, day and night, ever since, without having the opportunity to stop long enough to make such repairs as are actually necessary. These works contain three batteries of boilers, two of them being thirteen years old, and it requires great care and attention to keep them in order, causing an unnecessary expense to the city. These works should be repaired at once, and would have been, but owing to the scarcity of water, one pump could not be stopped without the scarcity being felt in our mills and manufactories, and as soon as such pipes are laid (as recommended in another part of this report) to give a sufficient supply of water to the Lower Reservoir, the works can then be stopped and put in good order. On September the 22d, the piston rods of the steam cylinder of the Sampson engine pulled out of the piston head, causing the stoppage of one pump. The river being very low, the remaining pump could not be fast enough to keep up a supply in the Lower Reservoir for supplying the upper pumps on Bedford avenue. In consequence, the hill district was scarce of

water, as the Herron Hill Reservoir had been drained for the purpose of ascertaining the location of leak. The Herron Hill pump was started September 23d, for the purpose of supplying Bedford Avenue Reservoir; also, the upper wards, and the district down Wylie avenue to the Court House. The repairs to Sampson engine were completed on the night of September the 25th. January 26th, 1881, the same accident occurred to the Sampson engine. At the same time a pipe bursted in the 36-inch line on Butler street extension, at Haight's Run bridge. This line had been supplying all the water to the district along the Allegheny river from Sharpsburg bridge to the Ninth ward, said district containing a number of iron works. For the purpose of supplying this district, the gate on the 20-inch line was opened seven inches. The next day it was discovered that by opening this gate the Bloomfield district was completely deprived of water, that district depending on the 20-inch for its supply. (In reference to this matter, see report on main supplies). The repairs to the Sampson engine were completed January 29th, 1881.

FORTY-FIFTH STREET WORKS.

Last Spring, the old smoke stack at these works was blown down, being badly rusted. I thought it advisable to procure a new one, so as to keep the works in running order in case of accident at the New Works. These works have run but one month during the past year, and are now considered abandoned. On the 17th of December, I reported to the Water Committee that the pumps and boilers were in good order, but that the foundations of the pump pits and boiler house was in a dangerous condition, and if not attended to would result in destroying the pumps and boilers. The matter was referred to the Sub-Committee on Machinery, but they took no action. This should be attended to at once. The building, pumps and boilers belong to the city; the ground to the A. V. R. R.

BEDFORD AVENUE WORKS.

These works are badly out of repair, requiring two new breechings, one new smoke stack and two new mud drums, These repairs should be done at once in order to save additional expense in case of an accident. The engine and boiler houses are badly in need of new roofs, the present ones being dangerous and liable

to fall at any time. April 21st, the foundation under the upper battery of boilers settled so much as to make the boilers unsafe for use. I was compelled to cut the legs off the mud and steam drums in order to allow the workmen to get at the repairs, which was completed April 27th. May 13th, one of the boilers in the lower battery of boilers was found to be leaking. After examination, it was discovered that the flange of the boiler head, and also the flanges of both ends of the flues, had been badly fractured, requiring said head and flue flanges to be replaced with new ones. At present these works are run to their utmost capacity, being compelled to run the old and new pumps almost constantly, as the supply in the Upper Reservoir when full will last but six hours. Some provision should be made to receive a partial supply from Herron Hill Reservoir. These works supply all the hill district; also, down Wylie avenue to the Court House; out Fifth avenue extension to Hiland avenue; along Second avenue from the Pennsylvania Forge to Glenwood. These are very important districts. The Fifth avenue extension route is very large and thickly populated, and it is impossible to give a sufficient supply of water with the present connections. Second avenue is also a very important district, requiring a very large supply of water to meet the demand on this route. There is one steel works, four rolling mills and two blast furnaces. Supplying these with water from the Upper Reservoir could be discontinued by laying a pipe from Herron Hill Reservoir to Fifth avenue extension. Through this line, all the district south of Fifth avenue could be supplied, it being to receive a supply from Hiland Reservoir. By having this connection made, all the high points south of Fifth avenue could be supplied from Herron Hill Reservoir, and all the low points in that and the Second avenue district could be supplied with abundance of water from Hiland Reservoir. This work will cost considerable money, as there was no provision made for making connections at Herron Hill Reservoir, but as it is the only possible way out of our present troubles I recommend that it be done as soon as possible.

STREETS AND MAINS.

During the year was laid 6,550 feet of water pipe, most of the work being done by contract, the city men being engaged in repairing breaks and leaks in the mains. I found it necessary dur-

ing the cold weather to increase the force of street hands to keep the fire plugs from freezing, in order that they might be in readiness in case of fire; being compelled at times to keep the men working day and night. March 4th, the main pipe on Webster avenue, between Washington street and Seventh avenue, bursted, it being an old pipe, and 18 feet deep, and almost impossible to get at for repair. A new one was laid 189 feet long, the old one being abandoned. On March 13th, and a number of days following, was compelled to lay 225 feet of 4 inch pipe on Chatham street to make new connections with fire plugs.

During the month of April the following pipes were laid and connections made to fire plugs: Connection made to plug corner Boquet and Semple streets, and 25 feet of 6-inch pipe laid. Connection made to plug on Market street near Liberty, and 27 feet 6-inch pipe laid. Connections made to plug on Brady street, and 158 feet of 4-inch pipe laid.

During the month of May, connections were made between the 12-inch main on Madison avenue and the 6-inch main on Thirty-third street; also, from the 6-inch main on Thirty-third street to the 4-inch pipe on Bedford avenue. During the same month, connections were made with four fire plugs on Stevenson street from the new 8-inch main. July 20th, the embankment at Thirty-third street slipped, breaking a joint in the water main, causing the main to be shut off until the pipe was repaired, which was completed July 27th. During the month of September, 24 feet of 4-inch pipe was taken up on Ross street, and 315 feet of 12-inch pipe lowered on Dinwiddie street. November 17th, the 15-inch main on Wylie avenue broke and was repaired immediately, the men working day and night. On November 20th, a very bad break occurred in the 8-inch main, corner of Market street and Third avenue, and ere it was repaired another break occurred on the same line at the corner of Market and Diamond streets. An extra force of workmen were employed, who worked day and night, as it was important to have the breaks repaired at once, as great damage might ensue in case of fire. During the month of November, connections were made on Devilliers street by laying 252 feet 4-inch pipe.

As many of our citizens desire to use water for hydraulic elevators, and as the present mains in the city are not large enough for

the present consumption, I would recommend that a 24 or 30-inch pipe be laid on Smithfield street as soon as possible; also, all connections with the same. In my last report, I recommended that a 12-inch pipe be laid along Grant street, from Liberty street to Fifth avenue, connecting with the 12-inch descending main on that avenue. I also recommended that an 8-inch pipe be laid on Fifth avenue from McGee to Ross streets in place of the 4-inch now in use, as it is inadequate to supply the demand. I also call your attention to the importance of the connection to be made between the 36-inch main on Liberty avenue and the 20-inch main on Penn avenue near Thirty-fourth street. When this is completed, the 36-inch pipe will drain all the water from the 20-inch on Penn avenue, thus depriving the Bloomfield district of water. To prevent this, I recommend that a pipe be laid from the 20-inch main on Centre avenue, along Liberty avenue to Bloomfield. This will furnish the Bloomfield district with sufficient water for all purposes, and leave an abundance for other parts of the city.

WATER EXTENSION.

Hiland Reservoir and Butler street extension, 36-inch main.

On the 3d day of March, the valve chambers of the new pumps at Brilliant Water Works were so badly broken that the pumps were stopped immediately, leaving but 2½ feet of water in Hiland Reservoir, causing a scarcity of water in the districts receiving their supply from the 30-inch main on Hiland avenue. To relieve these districts as much as possible, the bulkheads at the Reservoir were taken off. At this time the battery of three boilers at the Forty-fifth Street Works had been taken down and removed to Herron Hill pump house. The remaining battery of two boilers was not in condition to be used at the time, but were promptly repaired and the suffering districts supplied with water. On the 9th day of March I reported to the Sub-Committee on Machinery the advisability of erecting the influent and affluent gates at Hiland Reservoir, the water being drained out of the Reservoir, and and if done at this time would be a great saving of time and expense, and if done at another time, might be injurious to the city on account of scarcity of water. The Committee so recommended, and work was commenced on the and completed on the 18th of March. On the 26th of March, water was turned into the East

Liberty Valley from the Old Works, the water in Hiland Reservoir having been exhausted on account of the stopping of the pumps at the New Works for repairs. March 23d, resumed laying 36-inch pipe on Butler street extension along Reservoir avenue to Reservoir embankment, which was completed May 12th. Haight's Run bridge not being completed, the 36-inch main was not laid over that structure until September 10th. December 17th, the syphon pipe was completed through the embankment to the Reservoir, and, after making a careful examination and oiling all the gates along the line, the water was turned into the 36-inch main on December 20th, at 10.30 A. M. The water in the Reservoir at this time was but 5 inches above the bottom of the pipe. At 6 P. M. the same day, the water was 11 inches above the bottom of the pipe, which was not sufficient to give a good flow in the pipe. Next morning, the water was 2 feet above bottom of pipe, giving sufficient force to fill the pipe by noon. It was discovered that the cap of the wash-out near the oil refinery above Sharpsburg bridge was leaking very badly. The water was shut off and the leak repaired at once. December the 22d, the water was turned on again, and at 3 o'clock P. M. the 36-inch pipe was full from Reservoir to Forty-ninth street, and at 5 o'clock P. M. water was turned into the 20-inch pipe, thus conveying the water into the city. Every precaution was taken to fill the pipe gradually in order that the air might escape without concussion to the pipes, thus preventing, if possible, accidents in the way of bursts; but nevertheless after the pipes had been full about three hours a pipe bursted about 2,200 feet west of Haight's Run bridge. The water was shut off promptly, and break repaired before any damage was done. On Monday, December 27th, the water was turned on the third time. The pipes were full by noon, when another pipe, about 500 feet from the first break, bursted. The water was shut off again and the break repaired, but owing to the very cold weather, causing great trouble in making joints, the work was not completed until January 1st, 1881. On January 4th, 1881, another pipe bursted on Butler street, near the Standard Oil Works. As I was not notified of the break until seven hours after it occurred, great damage was caused by flooding a number of houses on the opposite side of the street. These pipes were laid by the Water Commission, who left no provision for washing out the pipe in this section, in this case

compelling us to obtain an engine from the Fire Department to pump the water out of the pipes before the break could be repaired, which was completed January 9th. January 14th, water was turned on, and everything worked satisfactorily until January 22d, when a pipe bursted at the east abutment of Haight's Run bridge, causing great trouble, owing to the pipe being swung under the bridge. This break, and also a leak on the bridge, caused by a pipe drawing one inch out of joint by contraction from cold weather, will be repaired as soon as possible, and I hope for better success in the future.

HERRON HILL.

In the month of March, the influent and affluent gates were placed in position at Herron Hill Reservoir. In May, the contractor had the engines ready for work. On the 22d, water was turned into the 20-inch main on Centre avenue, but it was discovered that the two 12-inch branches were without plugs and dead caps at the intersection of Liberty and Centre avenues. Water was turned off at Roup's street and necessary repairs made. At 10 o'clock A. M., same day, a pipe bursted between Roup street and Hiland avenue and was repaired at once. May 26th, the pump was started, running three hours, forcing water into the Reservoir, and working successfully. May 31st, the 20-inch main on Centre avenue bursted west of the railroad bridge. Same day, ascertained there was an obstruction in the pipe between the bridge and Neville street, and, after digging for three days, found a 20-inch gate five feet below the surface and closed at the intersection of Millvale street and Centre avenue. On June the 4th, pumped one hour; on the 5th, three hours, and on the 7th, seven hours, everything working satisfactorily. On the 10th, another 20-inch pipe bursted on Centre avenue, and was repaired promptly. From the 11th to the 18th, the pumps were run but a few hours each day, as the engine was not working satisfactorily. It was stopped in order to enable the contractor to remedy the defect. The engines were started on the 28th of June. On the 29th, a pipe bursted on Centre avenue, and was repaired on the 30th. July 1st, the pumps were started, everything working satisfactorily with the exception of the loss of steam from the steam cylinder, caused by defective packing, which was replaced by new packing. Since

that time the pumps have been working successfully. June 26th, water was turned on from Herron Hill Reservoir to the following streets. Madison avenue from Madison avenue to 33d street at the intersection of Bedford avenue to Shaffer street, on Bedford avenue from upper end of Car Stables on Herron avenue to Centre avenue, from Centre avenue at coal pit to the 13th Ward school house, from Centre avenue up to the crown of Arthurs property. Also, all the pipe and connections on Ridge street, in all about four miles. July 2nd, a leak was discovered in Herron Hill Reservoir, it was reported to the Committee, the leak was partially repaired and will be completed during the summer. During the winter I was compelled to waste considerable water on Centre avenue, by allowing the water to escape through a one inch opening in order to keep up a flow in the pipes that were unprotected to prevent freezing, the water flowed 468 hours and was drawn from Hiland Reservoir.

Respectfully submitted,

JAMES M. ATKINSON,

Sup't Water Works.

NEW STOP GATES PUT IN DURING YEAR 1880.

4 inch Gate at Kirkpatrick street and Hill alley.
4 " " Corner 5th avenue and Vine street.
4 " " Webster avenue.
4 " " Herron Hill Pump House.
4 " " Corner Stevenson and Gibon streets.
4 " " " " " Mercy Hospital.
4 " " Second Avenue and Iron City Brick Works.
4 " " Stevenson and Forbes street.
4 " " 5th Avenue and Washington street.
4 " " 33d street near Car stable.
4 " " Soho street top of hill.
6 " " Shaffer street.
6 " " Reservoir avenue.
6 " " Charlotte and 34th street.
6 " " " " 35th street.
6 " " " " 36th street.

6 inch Gate, 42nd street near Davidson street.
6 " " Todd street near Denniston avenue.
12 " " Herron Hill Pump House.
12 " " Corner Hiland and Centre avenue.
12 " " Corner Centre and Liberty avenues.
15 " " Between Centre ave. and Herron Hill pump house.
20 " " Butler and 49th street.
30 " " Hiland avenue near Reservoir.
36 " " Butler and 49th streets.
36 " " Reservoir and Check Valves.
36 " " On Main near Reservoir embankment.
36 " " Relief valve on Reservoir avenue.
12 " " " " " Herron Hill pump house.

Total number New Gates 28.
" " " Boxes and Covers 28.

2 Influent Gates at Hiland Reservoir.
2 " " " Herron "
2 Affluent " " Hiland "
2 " " " Herron "

Total Valves and Gates in the city 1338.

PIPE EXTENSION DURING THE YEAR.

	Feet.
4 inch pipe on Webster avenue	196
4 " " " Chatam street	233
4 " " " Corner Sample and Bouquet street	15
4 " " " Herron Hill pump house	72
4 " " " Brady street	158
4 " " " Stevenson street	58
4 " " " Devillier street	256
4 " " " Soho street	633
4 " " " Charlotte street	13
4 " " " 42nd street	22
4 " " " Todd street	23
6 " " " Reservoir avenue	14
6 " " " Market street near Liberty	35
6 " " " Todd street	506
6 " " " Charlotte street	1092
6 " " " Forty-second street	506
6 " " " Semple street	25

		Feet
6 inch pipe on	Larimer avenue	12
6 " " "	Centre and Madison avenues	8
6 " " "	Centre and Bedford avenues	12
6 " " "	Brady street	8
6 " " "	Butler street extension at wash out	27
12 " " "	Centre and Hiland avenues	12
12 " " "	Herron Hill pump house	109
12 " " "	Centre and Liberty avenues	12
12 " " "	Thirty-third street and Madison avenue	29
12 " " "	Herron Hill pump house	13
15 " " "	Butler and Forty-ninth streets	32
20 " " "	" " " "	36
36 " " "	" " " "	1349
36 " " "	Butler street extension	478
36 " " "	Haights Run Bridge and connections	546
36 " " "	Reservoir avenue to Reservoir embankment	
	Total number feet of pipe laid during year	6550
	Total length of pipe in the city	112½ miles.

PIPE ON HAND AND NOT LAID.

		Feet
30 inch pipe for	Smithfield street	3036
36 " " "	Liberty street	384
	Total	3420

FIRE PLUGS AND BOXES.

Fire Plugs	Repaired 62
" "	Lowered 9
" "	Renewed 25
" "	Raised 6
" "	Re-set 9
Boxes	Renewed 13
"	Repaired 9
"	Raised 8
"	Lowered 9
"	Over-hauled by plug men 582

SOUTH SIDE PLUGS.

New Valves put in plugs	6
Plugs repaired	9
New boxes	5
Plugs renewed	1

STOP GATES AND BOXES.

Stop Gates repaired	18
" " Boxes repaired	26
" " " raised	14
" " " cleaned	9
" " " renewed	35

MAIN PIPES.

Breaks and leaks repaired	156
Number of sleeves used	48
" new connections made	25
" blank caps used	26

PIPES LOWERED.

		Feet
4 inch pipe on	Vicroy street	90
12 " " "	Dinwiddie street	315
	Total	405

PIPES TAKEN UP.

6 inch pipe on Ross street.....24 feet.

NEW FIRE PLUGS PUT IN DURING THE YEAR 1880.

1 Plug corner of Chatam and Fountain streets.
2 " Todd street 500 feet east of Denniston avenue.
3 " Forty-second street, 600 feet above Davidson street.
4 " Charlotte street and Thirty-fifth street.
5 " " " " Forty-third street.
6 " Soho street, top of hill.
7 " " " 600 feet north of last plug.
8 " Corner Semple and Bouquet streets.
9 " Herron Hill pump house.
10 " Second avenue and Iron City Brick Works.
11 " Lake street, 300 feet from Lincoln avenue.
12 " Reservoir avenue.
12 New Boxes for the same.

Number of Gallons Pumped per Month for Year Ending January 31st, 1881.

LOWER WORKS.

Months.	Samson.	Hercules.	Cooper No. 1.	Total.	Daily Average.
February	66,306,240	93,265,920	169,200	159,572,160	5,502,488
March	150,575,040	153,146,880	.....	303,891,120	9,802,939
April	88,482,240	79,488,000	.....	167,970,240	5,599,008
May	123,076,800	155,531,520	.....	278,608,320	8,987,365
June	149,022,720	169,309,440	.....	318,332,160	10,611,072
July	153,014,400	178,053,120	.....	331,067,520	10,679,517
August	150,575,040	178,053,120	.....	328,628,160	10,600,908
September	134,164,800	175,403,520	.....	309,568,320	10,318,944
October	171,270,720	187,450,200	.....	358,720,920	11,571,642
November	157,081,140	191,020,680	.....	348,101,820	11,429,345
December	145,629,900	194,293,620	.....	339,923,520	10,800,793
January	125.908,320	162,796,800	.....	288,705,120	9,173,373
Totals	1,615,077,360	1,917,812,820	169,200	3,533,089,380	9,679,422

BEDFORD AVENUE WORKS.

Months.	Lowry Engines.	Old Engine.	Total.	Daily Average.
February	82,999,468	18,527,601	101,527,069	3,500,932
March	89,195,385	37,540,238	126,735,623	4,088,245
April	82,709,040	27,853,680	110,562,720	3,686,424
May	88,312,273	40,547,287	128,859,560	4,156,760
June	84,957,180	35,697,150	120,654,330	4,021,811
July	78,951,912	36,916,646	115,871,558	3,737,781
August	77,234,826	33,089,418	110,324,244	3,558,524
September	62,006,730	22,449,300	84,456,030	2,815,201
October	79,052,480	30,098,706	109,151,186	3,521,006
November	74,542,980	27,855,770	102,396,750	3,413,225
December	78,739,752	31,130,138	109,869,890	3,544,190
January	78,201,933	23,447,036	101,648,969	3,278,999
Totals	956,906,959	365,150,970	1,322,057,929	3,621,802

Running Time and Number of Gallons Pumped by Herron Hill Pumps.

NEW PUMPS, YEAR ENDING JANUARY 31, 1881.

Months.	Time.	Number of Gallons.	Daily Average.
July	220½	18,265,738	589,214
August	324	26,848,864	885,447
September	318	26,341,848	874,728
October	116	9,208,976	297,063
November	174	14 134,464	471,145
December	224½	18,596,680	599,892
January	255	21,142,670	682,021
Totals	1632 hours.	134,539,240	625,762

Running Time, Engines, Lower Works.

1880.	Samson..	Hercules.	Cooper No. 1.
February	299 hours	352 hours	3 hours.
March	679 "	578 "	.....
April	399 "	300 "	.....
May	555 "	587 "	.....
June	672 "	639 "	.....
July	690 "	672 "	.....
August	679 "	672 "	.....
September	605 "	662 "	.....
October	631 "	630 "	.....
November	631 "	642 "	.....
December	585 "	653 "	.....
January, 1881	569 "	610 "	.....
Totals	7,094	6,997	3

Running Time, Engines, Bedford Avenue Works.—Revolutions per minute.

Months.	Lowry Engine.	Old Engine.	Lowry Engine.	Old Engine.
February	643	191	12	14
March	691	587	12	14
April	699	335	11	12
May	721	418	11	14
June	708	368	11	14

July	734	444	11	14
August	718	398	11	14
September	577	270	10	12
October	735	362	10	12
November	706	335	10	12
December	731	374	10	12
January	727	282	10	—
Totals	8,390	4,164		

Lower Works.

COAL DELIVERED YEAR ENDING, JANUARY 31, 1881.

Months.	Number of Bushels.	Cost.
February	29,916	$ 1,869 75
March	48,592	2,836 71
April	34,511	2,273 90
May	37,992	2,564 46
June	42,086	2,840 80
July	43,589	2,912 26
August	39,366	2,657 21
September	41,203	2,781 20
October	41,598	2,807 87
November	44,336	2,992 68
December	40,881	2,759 46
January, 1881	42,001	2,835 07
Totals	4,850,71	$32,131 37

Daily average.....1,328 bushels.
Coal on hand, about.....9,000 "

Bedford Avenue Works.

COAL DELIVERED YEAR ENDING, JANUARY 31, 1881.

Months.	Number of Bushels.	Cost.
February	11,140	$ 500 19
March	13,448	603 82
April	14,500	684 74
May	12,862	900 34
June	12,854	896 51
July	12,822	897 54

August	12,744	892 08
September	10,720	750 40
October	12,338	863 66
November	12,402	868 14
December	12,425	869 75
January, 1881	13,561	949 27
Totals	151,816	$9,676 44

Daily average.....410 bushels.
Coal on hand.....2,000 "

Forty-fifth Street Works.

COAL DELIVERED DURING THE YEAR ENDING, JANUARY 31, 1881.

Month.	Number of Bushels.	Cost.
March	4,399	$241 95

Daily average.....146 bushels.

Herron Hill Pump House.

COAL DELIVERED DURING THE YEAR ENDING, JANUARY 31, 1881.

Months.	Number of Bushels.	Cost.
June	1,292	$ 169 28
July	4,688	348 94
August	5,082	367 43
September	5,492	395 63
October	1,519	109 75
November	2,775	200 63
December	2,741	198 17
January, 1881	3,550	256 67
Totals	27,139	$2,046 50

Daily average.....126 bushels.
Coal on hand.....1,000 "

Forty-fifth Street Works.

RUNNING TIME AND NUMBER OF GALLONS PUMPED DURING THE YEAR ENDING, JANUARY 31, 1881.

Month.	Number of Pump.	Time.	Number of Gallons.	Daily Average.
March	No. 1.	477 hours	13,165,220	
"	" 2.	90 "	2,484,000	
"	" 3.	345 "	9,522,000	
Totals			25,171,220	811,974

Number of Gallons Pumped per Month for Year Ending January 31st, 1881.

LOWER WORKS.

Months.	Samson.	Hercules.	Cooper No. 1.	Total.	Daily Average.
February	66,306,240	93,265,920	169,200	159,572,160	5,502,488
March	150,575,040	153,146,880		303,891,120	9,802,939
April	88,482,240	79,488,000		167,970,240	5,599,008
May	123,076,800	155,531,520		278,608,320	8,987,365
June	149,022,720	169,309,440		318,332,160	10,611,072
July	153,014,400	178,053,120		331,067,520	10,679,517
August	150,575,040	178,053,120		328,628,160	10,600,908
September	134,164,800	175,403,520		309,568,320	10,318,944
October	171,270,720	187,450,200		358,720,920	11,571,642
November	157,081,140	191,020,680		348,101,820	11,429,345
December	145,629,900	194,293,620		339,923,520	10,800,793
January	125.908,320	162,796,800		288,705,120	9,173,373
Totals	1,615,077,360	1,917,812,820	169,200	3,533,089,380	9,679,422

BEDFORD AVENUE WORKS.

Months.	Lowry Engines.	Old Engine.	Total.	Daily Average.
February	82,999,468	18,527,601	101,527,069	3,500,932
March	89,195,385	37,540,238	126,735,623	4,088,245
April	82,709,040	27,853,680	110,562,720	3,686,424
May	88,312,273	40,547,287	128,859,560	4,156,760
June	84,957,180	35,697,150	120,654,330	4,021,811
July	78,954,912	36,916,646	115,871,558	3,737,781
August	77,234,826	33,089,418	110,324,244	3,558,524
September	62,006,730	22,449,300	84,456,030	2,815,201
October	79,052,480	30,098,706	109,151,186	3,521,006
November	74,542,980	27,853,770	102,396,750	3,413,225
December	78,739,752	31,130,138	109,869,890	3,544,190
January	78,201,933	23,447,036	101,648,969	3,278,999
Totals	956,906,959	365,150,970	1,322,057,929	3,621,802

Running Time and Number of Gallons Pumped by Herron Hill Pumps.

NEW PUMPS, YEAR ENDING JANUARY 31, 1881.

Months.	Time.	Number of Gallons.	Daily Average.
July	220½	18,265,738	589,214
August	324	26,848,864	885,447
September	318	26,341,848	874,728
October	116	9,208,976	297,063
November	174	14 134,464	471,145
December	224½	18,596,680	599,892
January	255	21,142,670	682,021
Totals	1632 hours.	134,539,240	625,762

Running Time, Engines, Lower Works.

1880.	Samson.	Hercules.	Cooper No. 1.
February	299 hours	352 hours	3 hours.
March	679 "	578 "	
April	399 "	300 "	
May	555 "	587 "	
June	672 "	639 "	
July	690 "	672 "	
August	679 "	672 "	
September	605 "	662 "	
October	631 "	630 "	
November	631 "	642 "	
December	585 "	653 "	
January, 1881	569 "	610 "	
Totals	7,094	6,997	3

Running Time, Engines, Bedford Avenue Works.—Revolutions per minute.

Months.	Lowry Engine.	Old Engine.	Lowry Engine.	Old Engine.
February	643	191	12	14
March	691	587	12	14
April	699	335	11	12
May	721	418	11	14
June	708	368	11	14

July	734	444	11	14
August	718	398	11	14
September	577	270	10	12
October	735	362	10	12
November	706	335	10	12
December	731	374	10	12
January	727	282	10	12
Totals	8,390	4,164	—	—

Lower Works.

COAL DELIVERED YEAR ENDING, JANUARY 31, 1881.

Months.	Number of Bushels.	Cost.
February	29,916	$ 1,869 75
March	48,592	2,836 71
April	34,511	2,273 90
May	37,992	2,564 46
June	42,086	2,840 80
July	43,589	2,912 26
August	39,366	2,657 21
September	41,203	2,781 20
October	41,598	2,807 87
November	44,336	2,992 68
December	40,881	2,759 46
January, 1881	42,001	2,835 07
Totals	4,850,71	$32,131 37

Daily average.....1,328 bushels.
Coal on hand, about.....9,000 "

Bedford Avenue Works.

COAL DELIVERED YEAR ENDING, JANUARY 31, 1881.

Months.	Number of Bushels.	Cost.
February	11,140	$ 500 19
March	13,448	603 82
April	14,500	684 74
May	12,862	900 34
June	12,854	896 51
July	12,822	897 54

August	12,744	892 08
September	10,720	750 40
October	12,338	863 66
November	12,402	868 14
December	12,425	869 75
January, 1881	13,561	949 27
Totals	151,816	$9,676 44

Daily average.....410 bushels.
Coal on hand.....2,000 "

Forty-fifth Street Works.

COAL DELIVERED DURING THE YEAR ENDING, JANUARY 31, 1881.

Month.	Number of Bushels.	Cost.
March	4,399	$241 95

Daily average.....146 bushels.

Herron Hill Pump House.

COAL DELIVERED DURING THE YEAR ENDING, JANUARY 31, 1881.

Months.	Number of Bushels.	Cost.
June	1,292	$ 169 28
July	4,688	348 94
August	5,082	367 43
September	5,492	395 63
October	1,519	109 75
November	2,775	200 63
December	2,741	198 17
January, 1881	3,550	256 67
Totals	27,139	$2,046 50

Daily average.....126 bushels.
Coal on hand.....1,000 "

Forty-fifth Street Works.

RUNNING TIME AND NUMBER OF GALLONS PUMPED DURING THE YEAR ENDING, JANUARY 31, 1881.

Month.	Number of Pump.	Time.	Number of Gallons.	Daily Average.
March	No. 1.	477 hours	13,165,220	
"	" 2.	90 "	2,484,000	
"	" 3.	345 "	9,522,000	
Totals			25,171,220	811,974

Bedford Avenue Reservoir.

DEPTH OF WATER.

	Feet.	Inches.
February	9	
March	6	
April	8	
May	7	
June	8	
July	5	
August	6	
September	5	
October	4	
November	8	
December	7	6
January, 1881	4	
Lower Basin, average depth during the year	11	9

Account of Leaks from Private Connections with City Mains.

Parties notified of leaks in connections	1,359
" " " and water shut off	971
Leaks damaging property attended to	462
Hydrants repaired by lowering handles	231
Total	3,023
Mains shut off for repairs of private connections	61

Number and Size of Ferrules Sold.

Size.	Number.
1 inch	21
¾ "	29
⅝ "	49
½ "	86
Total	176

Price Received for Ferrules Sold.

144 Ferrules @ $3 50	$504 00
6 " " 3 00	18 00
23 Free "	
3 " 2 50	7 50
Total	$529 50

Average Number of Gallons of Water Pumped per Day by Old and New Works During the Year.

New Works	9,679,422 gallons.
Old "	

Capacity of Reservoirs.

Hiland Reservoir	117,650,188 gallons.
Herron Hill Reservoir	10,000,000 "

EXPENDITURES.

Superintendent's Office	$ 1,800 00

WATER ASSESSOR'S OFFICE.

Assessor and Assistants	3,754 04

LOWER WORKS.

Labor (Running Expenses)	9,458 55
Coal	32,161 37
Oil	305 53
Brick and Labor	203 08
Grate Bars and Liners	385 70
Hemp Packing	329 85
Gum	9 87
Miscellaneous Supplies	89 02
Hauling	24 22
Metallic Packing	735 55
Cleaning Boilers	90 00
Repairs to Engines and Boilers	603 78
Brass Work	409 28
Painting Stacks	8 00
Smith Work	52 72
Hardware	85 90
Lumber	4 05
Block and Tackle	47 31
Total	$46,003 78

UPPER WORKS.

Labor (Running Expenses)	4,759 11
Coal	9,676 44
Oil	184 86
Brass Work	122 48
Cleaning Boilers	31 50
Repairing Engines and Boilers	761 46
Gum Packing	50 27
Hemp Packing	94 20
Grate Bars	164 74
Miscellaneous Supplies	52 04
Smith Work	105 60
Brick Labor	168 25
Melting Pots	24 40
Total	$16,195 35

FORTY-FIFTH STREET WORKS.

Labor (Running Expenses)	$ 480 84
Machine Work	25 50
Plumbing	37 43
Coal	241 94
Hauling	21 25
Oil	9 24
Brick and Labor	32 00
Miscellaneous Supplies	3 50
Building Stacks	200 00
Painting "	4 00
Total	$1,055 70

STREETS.

Labor	$ 4,551 31
Carpenter, Driller, and Hydrant Men	2,640 90
Plug Men	1,180 80
" " South Side	1,125 00
Stop Gates	420 50
Ferrules	220 02
Lumber	289 29
Plugs and Nuts for Pipes	67 24

Smith Work	401 40
Hauling	350 75
Frames and Covers	197 44
Water Pipe	1,465 20
Tin Work	39 77
Laying 4–6 and 8 inch Water Pipe	414 03
Woolen Yarn	8 65
Fire Plugs	574 18
Repairs (Hiland anb Second avenues)	726 10
Martin Heyl—digging for leak	3 50
Bolts	64 80
Plumbing	9 62
Repairing Fountain	16 17
Total	$14,766 67
Repairs to Bedford Reservoir	191 87

HERRON HILL WORKS.

Labor (Repairing Expenses)	1,376 06
Coal	2,046 50
Smith Work	11 50
Repairing Boilers	230 65
Machine Work	188 00
Brass Work	160 44
Printing	22 75
Pipes and Elbows	21 49
Painting Stacks	4 00
Plumbing	3 17
Lumber	28 71
Brick Work	147 91
Packing	76 55
Rings for Stacks	60 00
Oil	61 59
Hardware	41 66
Repairing Engine House Wall	27 12
Making Road	125 00
Cement	152 00
Bolts	58 47
Hauling	49 00

Repairing Reservoir Gates	188 92
Stove Pipe	1 50
Glazing	4 80
Total	$5,087 79

NEW WORKS.

Labor (Running Expense)	$13,263 67
Coal	19,239 88
Hardware	809 47
Oil	545 65
Miscellaneous Supplies	210 32
Hemp Packing	123 18
Repairing Boilers	273 21
Brass Work	316 14
Gum Packing	811 80
Fire Brick	161 38
Valves	68 10
Gaskets	18 40
Machine Work	277 99
Hauling	44 00
Castings	154 82
Grate Bars	1,856 34
Shield for Boilers	202 33
Oil Tanks	60 75
Pipe and Fittings	59 49
Repairing Drill	29 51
Lumber	177 50
Turning Tests	114 66
Smith Work	35 60
Tile	37 68
Glazing	33 10
Freight	23 52
Printing	4 00
Polishing Tube Rails	32 00
Total	$37,984 49

REPAIRS TO HILAND RESERVOIR.

Booth & Flinn, Contractors	$ 3,043 42

The contract for repairing this Reservoir has not been completed—the contractors were compelled to stop work on account of cold weather.

RECAPITULATION.

Superintendent's Office	$ 1,800 00
Water Assessor's Office	3,754 04
Lower Water Works	46,003 78
Upper Water Works	16,195 35
Forty-fifth Street Water Works	1,055 70
Streets	14,766 67
Herron Hill Water Works	5,087 79
New Water Works	37,984 49
Repairs to Bedford Reservoir	191 87
" " Hiland "	3,043 42
Total	$129,883 11