SECOND ANNUAL MESSAGE

OF

EDWIN H. FITLER,

Mayor of the City of Philadelphia,

WITH

ANNUAL REPORT

OF

LOUIS WAGNER,

Director of the Department of Public Works,

AND

EIGHTY-SEVENTH ANNUAL REPORT

OF THE

BUREAU OF WATER

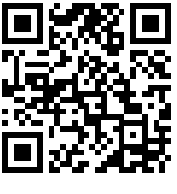
FOR THE

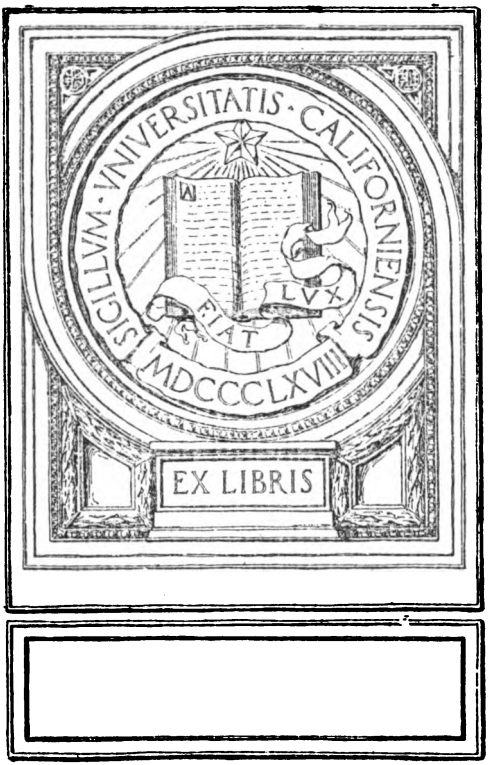
Year ending December 31, 1888,

ISSUED BY THE

CITY OF PHILADELPHIA, 1889.

PHILADELPHIA:
D. SLAP & CLARKE, PRINTERS AND BINDERS, 817-19-21 FILBERT ST.
1889.





Philadelphia

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SECOND
ANNUAL MESSAGE.

MAYOR'S OFFICE.

Philadelphia, April 1, 1889.

To the Select and Common Councils
of the City of Philadelphia.

GENTLEMEN:—The Act of Assembly approved June 1, 1885, makes it the duty of the Mayor:

I.—To cause the ordinances of the city and the laws of the State to be executed and enforced.

II.—To communicate to Councils, at least once a year, a statement of the finances and general condition of the affairs of the city, and also such information in relation to the same, as either branch of Councils may from time to time require.

III.—To recommend by message in writing to the Councils all such measures connected with the affairs of the city, and the protection and improvement of its government and finances, as he shall deem expedient.

In conformity thereto, my Second Annual Message is herewith presented for the consideration of your Honorable Bodies.

The ordinances of the city, and the laws of the Commonwealth, in so far as they apply to the City of Philadelphia, have been enforced with conscientious fidelity by all of the Executive Departments of the city.

Finances.

There probably never was a period in the history of our city when its finances were in a condition so gratifying as they are at the present time.

On the first of January, 1889, the funded debt amounted to fifty-seven million one hundred and forty-six thousand and ninety-five (57,146,095) dollars and twenty-two (22) cents, a decrease of eight hundred and twenty-one thousand three hundred (821,300) dollars since the first day of January, 1888. The assets of the city, consisting of railroad stock, City, State, and United States bonds, outstanding taxes, securities, and cash, amounted to thirty million seven hundred and seven thousand seven hundred and eighty (30,707,780) dollars and ninety-seven (97) cents, on the first day of January of this year, and in addition to this the city is the owner of real estate, the appraised value of which by the Board of Revision of Taxes, is forty-two million nine hundred and forty-six thousand three hundred and forty-four (42,946,344) dollars.

The total receipts from all sources during the year 1888, amounted to nineteen million six hundred and seventy-two thousand one hundred and ninety (19,672,190) dollars and fifty-four (54) cents, an increase of two million eighty-seven thousand nine hundred and thirty-four (2,087,934) dollars and eighty (80) cents, over the total receipts for the year 1887. The total disbursements during the year 1888 amounted to nineteen million seven hundred and eleven thousand two hundred and seventy (19,711,270) dollars and sixty-six (66) cents, an increase of two million seventy-two thousand nine hundred and sixty-six (2,072,966) dollars and sixty-one (61) cents over the expenditures for the year 1887, and which was applied mainly for the purpose of making permanent improvements.

Your attention was invited in my message of a year ago to the question of refunding the loans of the city at a lower rate of interest, but as no action has yet been taken by Councils in that direction, the matter is once more brought to your consideration, in the hope that such legislation may be enacted at an early day, as will result in bringing about a reduction of the city's liabilities for Sinking Fund account and interest.

It is believed that should this recommendation meet with the approval of your Honorable Bodies the result would be an annual saving of nearly one and a half million (1,500,000) dollars.

DEPARTMENTS.

Public Safety.

The improvements which marked the management of the Department of Public Safety, under Director Stokley's energetic control, have continued, and a still higher standard of discipline and effectiveness has been obtained, and the statement can be safely made that at no time in the city's history were the police force so vigilant and the fire service of the city more effective in the performance of their duties than now.

No great robberies occurred during the year, and while some petty burglaries were committed in the rural sections of the city, yet the prompt arrest, conviction and punishment of a number of such thieves attest the efficiency of the police service, and it has also taught the vicious that they cannot ply their criminal vocation with impunity, even in the more sparsely settled portions of the city.

The Bureau Reports made to the Director of Public Safety are herewith transmitted; they are official documents of great interest, showing the workings in detail of each Bureau, and it is hoped that the recommendations made by the Director may receive the consideration their importance merits.

Public Works.

The Director of the Department of Public Works is charged not only with the grave responsibility of the supply and distribution of water and gas; the grading, paving, repairing, cleaning, and lighting of streets and alleys; the construction, protection and repair of bridges, sewers, and drainage, and with the engineering and surveying of the city; but, being a money earning Department, it is a duty the Director owes to

the public to so manage its affairs as to cause the revenues imposed by law, and exacted by the Bureaus of his Department, to be borne as willingly by the tax-payers as possible.

That result is always difficult to obtain, and if reached at all, it can only be secured by rendering to the public a full and honest service in every particular. How well Director Wagner has succeeded in meeting the properly exacting demands of the citizens and tax-payers, can only be determined from a careful consideration of his exhaustive and highly interesting report of the operations of his Department for the year.

Some idea of what is being done by the Department of Public Works may be formed from these figures taken from the Director's Annual Report:

Thirty-nine and a half (39½) miles of gas pipes laid during the year 1888, making the total length now in use nine hundred and seventeen (917) miles.

The erection of a new gas-holder of two hundred thousand (200,000) cubic feet capacity.

The laying of four hundred and forty-five thousand three hundred and sixty-nine (445,369) square yards, or 152,217 linear feet, equal to twenty-eight (28) miles 4.378 linear feet of granite, asphalt, vitrified brick, and macadam pavements during the year 1888, as against one hundred and fifty-three thousand nine hundred and three (153,903) square yards, or 53,839 linear feet, equal to ten (10) miles 1,039 linear feet during the year 1887. Grading done, two hundred and thirteen thousand four hundred and seventy-seven (213,477) cubic yards, as against one hundred and thirty-nine thousand four hundred and fifty (139,450) cubic yards in 1887. Linear feet of curbing reset, one hundred and sixty-two thousand seven hundred and ninety-eight (162,798), as against seven thousand five hundred and one (7,501) feet during 1887; and notwithstanding the great increase in the amount of work done, the expenditures in the Bureau of Highways for 1888 were one hundred and fifteen thousand six hundred and twenty-one (115,621) dollars less than for 1887.

More work was done by the Bureau of Surveys than in any other year since it was organized, and its devotion to the public service is fairly attested by the fact that during the year 1888, it constructed about thirty-three (33) miles of sewers, as against twenty-two and one-half (22½) miles in 1887.

The erection of a subsiding reservoir of three hundred and six million (306,000,000) gallons capacity; the laying of twenty-five (25) miles, 1,552 linear feet of water pipe, and the placing in position of seven hundred and forty-six new style fire-hydrants serve to fairly indicate the energy of the Bureau of Water.

The recommendations made to me by the Director of Public Works are deserving of your careful consideration. They are the result of the mature deliberation of an officer skilled in the public affairs of the city, who has made each suggestion a matter of close study and personal examination, and are forwarded to your Honorable Bodies with my earnest approval.

Charities and Correction.

The report of the President and Directors of the Department of Charities and Correction presents a gratifying exhibit of the institutions under their charge.

The Philadelphia Hospital, the most important of the several institutions under their control, has received that systematic and thorough supervision to which it is entitled, and it is to-day recognized not only as the oldest and one of the largest, but as one of the best on the Continent. Its Training School for Nurses has won a National reputation, so that its graduates have been selected as Superintendents of similar institutions in various parts of the country. The testimony of prominent members of the Medical Staff of the Hospital is to the effect that under the present management an efficiency of service has been attained as gratifying to them as it is beneficent to those who require the service.

The overcrowded condition of the Hospital—the one thing which more than anything else interfered with its efficiency—

is happily in the near future to be remedied by the building of a new Almshouse and the removal of the pauper element, thus affording the additional room which will enable this Department to make the Philadelphia Hospital an honor and a pride to the City of Philadelphia.

The plans for the new buildings to be erected for the accommodation of the Almshouse population will provide for a better classification of the inmates than has heretofore been possible. A series of buildings is contemplated thus affording in this respect and in many others great advantages over a single structure.

In connection with the House of Correction, the Report calls attention to two subjects which deserve the careful consideration of Councils. First:—The statement that the limit of gas production has been reached by the existing plant. If the large and rapidly increasing population in the vicinity is to be supplied from the House of Correction Works, provision should be made to meet the demand. Second:—The imperfect system of drainage of the House is a menace to the health of the inmates of the institution and provisions should promptly be made to remedy it.

Many much-needed improvements have been made by the Board in its several departments, for the details of which, and for suggestions of value, I refer you with gratification to the Report itself, which contains evidence of an intelligent and thoughtful administration of affairs, inspiring confidence in the successful working of the New City Charter, in reference to one of the most complex problems of municipal government.

In addition to the foregoing, the Reports of

The Department of Receiver of Taxes,
The Department of City Treasurer,
The Department of City Controller,
The Department of Law,
The Department of Education, and
The Sinking Fund Commission,

are herewith transmitted for your consideration.

During the two years of my term as Mayor, it has been my constant and earnest endeavor to afford the amplest protection to life and property; to improve the condition of the water supply; to greatly improve our badly paved streets, and to promote their cleanliness; to better the quality of illuminating gas, and to cheapen the cost of its production; to secure the removal of the Almshouse from its present location; and for the construction of a bridge over the Schuylkill river, at Walnut street.

It gives me pleasure to be able to say, that a careful survey of the work already done warrants the statement that with the exception of the cancellation of the interest bearing bonds in the Sinking Fund, and a refunding of the bonded debt, all the other aims and purposes indicated have, owing to your kind co-operation, either been secured, or are likely to be within a reasonable time.

The rights and privileges granted to corporations to use streets of the City for electrical, and for steam or other artificial heating purposes, etc., are certainly valuable franchises, profitable to those concerned in them, and they should be made to yield a large revenue to the city, in the form of a license fee or otherwise; it remains for you to so legislate that such a revenue may be secured.

The City owns a large amount of vacant land that could be sold to great advantage at this time, and made to yield not only a large amount in principal, but in taxes, after it is improved. It has been represented to me that there are over fifty (50) acres located in the Twenty-second Ward, and even more than that in the Twenty-fourth Ward, and much of it desirable for improvements, especially that portion on Bryn Mawr and Boundary Avenues, near George's Hill. I respectfully submit this suggestion for your consideration.

A portion of the Almshouse ground lying along the west bank of the Schuylkill, and below South street, has been set apart by your Honorable Bodies, several years ago, for use as a Public Park. Its early completion as a pleasure ground is

due to the large number of citizens residing on both sides of the river, and particularly to those in the closely built up wards east of the Schuylkill. A commencement of this work should be made at once by the construction of a retaining wall along the river front; the stone for same could be quarried, and the wall erected, by inmates of the House of Correction. For this important matter, I respectfully ask your early attention.

One of the most serious problems to be solved by your Honorable Bodies is that of abolishing grade crossings, restricting traffic on surface tracks and furnishing better terminal facilities for the traveling public. This is a vital and pressing question, and should be met as promptly as possible, in a spirit of equity and justice to all parties concerned.

While the rights of the city and of interested property owners must be guarded and protected, yet the interests of trade and commerce and the general welfare require that whatever action shall be taken in the matter must not be detrimental to our manufacturing interests, nor to the railroad companies.

The rapid growth and development of our city, the competition in trade and commerce, and the exacting demands upon the time of business men require the most rapid transit possible from the business centre of the city to other trade centres.

A terminal station at Twelfth and Market streets for the Philadelphia and Reading Railroad system; the elevation of their tracks on Pennsylvania avenue, on Willow street, and on Ninth street, is a question that the prosperity of the city, the public good, and the absolute requirements of the Railroad Company demand shall be met in a spirit of fairness and with intelligence. As we cannot escape its consideration even if we would, let us therefore meet it as becomes the representatives of a great and growing city.

In conclusion, permit me to say, that your assistance has been freely given, and almost without question in all affairs

relating to the municipality during the two years of my term as its Chief Magistrate. For the trust and confidence thus reposed in me, you have my gratitude, and it is my sincere hope that the pleasant relations existing between us, personal as well official, may continue to the end, and I earnestly invoke your further co-operation in my efforts to promote the general welfare, by endeavoring to maintain an honest and faithful administration of public affairs.

I am, respectfully,

EDWIN H. FITLER,

Mayor.

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS,

FOR THE YEAR 1888.

1 w

OFFICERS

OF THE

Department of Public Works.

Director,

LOUIS WAGNER.

Chief Clerk,

HARRY W. QUICK.

CLERK—WILLIS SHEBLE.
STENOGRAPHER—W. W. ALEXANDER.
TYPEWRITER—ROBERT DOWNING.
MESSENGER—JAMES A. JUNIOR.

Superintendent of City Ice Boats,

H. E. MELVILLE.

Chiefs of Bureaus:

GAS—WILLIAM K. PARK.
HIGHWAYS—GEORGE A. BULLOCK.
STREET CLEANING—SYLVESTER H. MARTIN.
SURVEYS—SAMUEL L. SMEDLEY.
WATER—JOHN L. OGDEN.

SECOND ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS.

LOUIS WAGNER, Director.

Philadelphia, January 2, 1889.

HON. EDWIN H. FITLER,
Mayor of Philadelphia.

SIR:—In accordance with law, I have the honor to present the report of the Department of Public Works for the year ending December 31, 1888; the second report of the Department, but the first for a full fiscal year, the previous report covering the operations of the nine months from April 4 to December 31, 1887.

The belief expressed in the concluding paragraph of my former report, "that with the increased appropriation for 1888, and the experience of the year then closed, the citizens and taxpayers of Philadelphia would not be disappointed in their hopes and expectations of the benefits to result from the operation of this Department," has been verified by the work of the past year.

There has been more efficient service by all the officers and employés; the economies begun and continued contribute to a more satisfactory administration of affairs; and the improvements in gas, highways, sewerage, and water are becoming more manifest by reason of the enlarged operations of the respective Bureaus having charge of these several interests.

The Chief Clerk and his assistants in the Director's office discharge their multifarious and increasing duties with commendable promptness, and the many matters not coming under the immediate control of any particular Bureau, but requiring my direct personal supervision, receive the attention their importance demands.

Bureau of City Property.

The Bureau of City Property was, by ordinance of Councils approved March 22, 1888, transferred to the Department of Public Safety, and the report of this important branch of the city's service for the two months and twenty-two days, from January 1, 1888, to the date of transfer, will no doubt be included in the regular report of that Department.

City Ice Boats.

The three ice boats received the usual repairs incident to a winter's service, after having been in commission from December 29, 1887, to February 29, 1888.

The following summary is an abstract of the work done by them, and of the receipts for towage, and the expense of maintenance during the year 1887–88:

	1886 and 1887.		1887 and 1888.	
	Number.	Tonnage.	Number.	Tonnage.
Vessels, outward	13	15,724	5	4,842
" Inward	12	9,697	11	6,084
" Assisted	1	240	.....	.....
Total	26	25,661	16	10,926

	1886 and 1887.	1887 and 1888.
Amount received for towage and assistance rendered	$7,311 48	$2,701 73
Amount received from sale of old material	154 84	60 92
Total paid City Treasurer	$7,466 32	$2,762 65

	1887.	1888.
Total amount of warrants drawn	$37,029 12	$38,983 19
Deduct cash paid City Treasurer	7,466 32	2,762 65
		$36,220 54
Deduct cost of dredging and construction of dock at Holmesburg Junction		2,500 00
Actual expenditures	$29,562 80	$33,720 54

These figures show a material decrease for the past year in the receipts for towage and the total tonnage of vessels towed, a proof that the river was kept so nearly free from packed ice that the regular tow-boats were able to care for the vessels sailing to this port.

The rules of the Department forbid soliciting of towage, but require persistent efforts to keep the channel open for navigation. The commendatory letters named by the Superintendent in his report show that these efforts were more than usually successful.

A trip to the bay on Boat No. 3, on one of the coldest days of last winter, gave me ample opportunity to judge of the general management of affairs, which was satisfactory in all respects.

The office heretofore occupied by the officers of the boats was vacated in March last, and these officers have since then made their headquarters on the boats whilst they were not in commission; and during the winter months, when it was necessary to have prompt communication with the shipping interests, an office was readily secured on the river front. By this arrangement considerable money was saved in rent and other office expenses.

The dock at the grounds of the House of Correction and within the city limits, referred to in the last report, was constructed this year at a cost of $2,500, and on August 22 the boats were removed to this place. By this arrangement the city will save the sum of $1,200 heretofore paid annually for

wharfage, and the boats will be more readily under the control of the City's officials.

Barring possible accidents the only extensive work required this year will be the cleaning and painting of the bottoms of the boats, and the construction of iron bulkheads on Boat No. 2.

Lighting the City.

The lighting of the city continues as heretofore under five different, and to some extent independent, branches of the public service. It is my intention shortly to submit for your consideration a plan to consolidate this whole service into a "Bureau of Lighting," by which better service, at less cost than at present, can be secured.

The following comparative summary shows the increase in lamps and expenditures during the past year:

Summary of Increase in Lamps and Expenditures.

	1887.		1888.	
	Number.	Cost.	Number.	Cost.
Electric Arc lights	524	$87,974 53	756	$120,133 52
Gasoline lamps	5,297	116,586 09	5,932	131,301 94
Gas lamps supplied by the Northern Liberties Gas Company	472	10,701 45	415	9,429 55
Under charge of Bureau of Gas	*16,473		*17,261	
Total	22,766	$215,262 07	24,364	$260,865 01

*Not lighted because of proximity to electric lights:

1887	1,062
1888	2,034

The subject of locating additional lamps remains in the unsatisfactory condition named in the last report, no general ordinance regulating this important matter having been adopted.

So frequent are the complaints by members of Councils and by other citizens of the manner in which lamps are crowded

into some, to the deprivation of other, localities, that it is hoped that some steps may be taken at an early day to put this matter into a more equitable shape.

The electric lighting by underground wires continues to give satisfactory service notwithstanding the claims of some, who, whilst actually lighting many lamps in this way, protest against its practicability, The Department knows of no reason, other than the first cost of the work, why all the overhead lighting wires should not or could not be placed under ground. The matter of expense is one that would adjust itself were the companies engaged in this business compelled, by the adoption of proper ordinances to that effect, to remove from over the city streets this constant and ever present source of destruction and death.

Under the appropriations for the current year 266 electric lights will be erected, 19 of them probably on the lines of conduits laid on Diamond street and on Broad street, and extension of these conduits is now under consideration by the Electrical Bureau.

After public advertisement the contracts for electric lighting were renewed for one year with the companies heretofore furnishing this service, at an average reduction of $2\frac{1}{3}$ cents per night per lamp, and of 10.736 per cent upon the price paid in 1887, which upon the amount appropriated for 1889 represents a saving of $17,442.38.

The following table is a schedule of the prices paid in 1887 and 1888 and of the contract price for 1889:

Summary of Prices Paid for Electric Arc Lights in 1887 and 1888, and Contract Price for 1889.

	1887.	1888.		1889.	
		No.	Price.	No.	Price.
BRUSH ELECTRIC LIGHT COMPANY.					
South from south side of Washington avenue between Delaware and Schuylkill rivers	59½ & 62½	41	54	41	54
From north side of Market street to south side of Callowhill street, and west side of Broad street to Schuylkill river	.....	18	47½	17	47½
South side Spruce street to north side of Washington avenue, between Delaware and Schuylkill rivers	54	116	50	116	47½
South side Market street to north side of Spruce street, between Delaware and Schuylkill rivers.	50 & 52½	86	47½	86	45
West of Schuylkill river	55	69	50	69	50
UNITED STATES ELECTRIC LIGHT COMPANY.					
North from north side of Market street to south side of Poplar street; east from east side of Broad street to Delaware river	50, 55, 57½	94	50	106	49
PHILADELPHIA ELECTRIC LIGHT COMPANY.					
West from East side of Broad street, and north of Callowhill street	50 & 55	86	47½	87	45
North from south side of Callowhill street, and between Broad and Eighth streets	52½	26	49½	30	47½
NORTHERN ELECTRIC LIGHT AND POWER CO.					
East of, and including, both sides of Thirteenth street; north o , and including, both sides of Poplar street	55	152	49	136	48
WISSAHICKON ELECTRIC LIGHT COMPANY.					
Between Allegheny ave., Twenty-eighth Ward, and Leverington ave., Twenty-first Ward	No lights.	17	55	17	55
FRANKFORD ELECTRIC LIGHT AND POWER COMPANY.					
Between Bridge street, and below Asylum turnpike, and east of it, and in Frankford	½ night 40	24	55	24	55
GERMANTOWN ELECTRIC LIGHT COMPANY.					
In the borough of Germantown, Twenty-second Ward	55	27	55	27	55

1887. 524 lights average price 54⅛
1888. 756 lights average price ..... 50 ⅝
1889. 1,022 (estimated) lights average price ... 48½

The contracts for electric lighting call for arc lights of not less than 2,000 candle power, but it is claimed that the lights furnished fall very far below these figures. The contractors claim that "2,000 candle power" is merely a commercial term, and that the lights are of the standard contracted for.

In the advertisement for the year 1889 bidders were asked to designate by what standard their lights were to be tested, and the new contracts are made accordingly. The Chief of the Electrical Bureau is now perfecting appliances for testing these lights, and the companies will be required to comply strictly with their contracts in the matter of candle power as well as in the number of lights supplied by them.

The amount paid for lighting the city by electricity and by gasoline is growing so rapidly that the question of assuming this work by the city should have early consideration. There is no more reason why the city should not own one or more electric light plants than why she should not own one or more gas works or water works, and with proper appropriations for such plants the profits now made by the corporations doing the work would be saved to the city.

In this connection it is proper to call attention to the fact that the Bureau of Gas is charged on the books of the city, and in its report, with the expense of lighting and maintaining the public gas lamps, and not credited with the value of the gas furnished for this purpose—a procedure manifestly improper and misleading, when the cost of the management of that Bureau is considered.

The amount actually paid for this service during the year 1888 was	$157,809 32
And the amount of gas furnished free of cost was 451,960,781 cubic feet, worth at $1.50 per thousand feet	677,941 17
Total	$835,750 49
The amount of gas furnished increased over 1887, 11,402,600 cubic feet, and the cost of maintenance, etc., decreased	$16,317 53

All public lights burn every night and all night, which is not the case in all other cities.

Bureau of Gas.

The work of the past year justifies the claim made in my previous report that the economies introduced in the management of this Bureau would result in large profits to the city.

The estimates of receipts and expenditures sent to the Controller in August last were in excess of the actual results of the year, but not to the extent claimed in the annual report of that officer. Whilst it is true that the receipts from all sources were $124,616.31 less than the estimates, the expenditures were also $142,203.76 less, as follows:

Receipts estimated	$4,000,000 00
Receipts actual	3,875,383 69
Expenditures for current operations, estimated	3,250,000 00
Expenditures, actual	3,107,796 24

The deficiency in receipts as estimated was caused by our failure to take into account the fact that for nearly four months in 1887 the moneys received were for gas sold at $1.60 per 1000 feet, and the reduction in receipts, bacause of the reduction in the price of gas, was overlooked.

To reach correct conclusions, however, as to the actual financial results of the year, $125,000 received from the Schuylkill River East Side Railroad Company, for damage done by the construction of their road through the Ninth and Fifteenth Ward Works, should be deducted from the total of receipts.

This sum was the outcome of an arbitration between this company and the city, authorized by Councils in an ordinance approved March 9, 1888. The settlement was entirely satisfactory to both parties, and the thanks of the city are due to Mr. Jacob Naylor, the city's representative, for his able and efficient services in the matter.

In addition to the cost for current operations, $214,166.50 were paid out for new holders at the Fifteenth Ward station and the Twenty-fifth Ward Works, and for large supply mains in various parts of the city, this latter work being largely in

excess of the length of the mains laid for many previous years.

The total receipts were as follows:

For gas	$3,281,353 04	
For residuals	458,870 20	
From Schuylkill River East Side Railroad Company	125,000 00	
From sundries	10,160 45	
Total		$3,875,383 69

The total expenditures were:

For current operations of all kinds, including public lighting	$3,107,796 24	
For new holders and mains	214,166 50	
Total		$3,321,962 74
Excess of receipts over expenditures		$553,420 95

This reverses the figures for the previous years, when the total expenditures were always larger than the receipts, practically wiping out the cash balance of $660,317.45 on hand January 1, 1884, since which date the reports were as follows:

Deficit in receipts in 1884	$110,149 60	
" " " " 1885	143,590 74	
" " " " 1886	140,933 72	
" " " " 1887	108,528 02	
Excess of receipts, 1888	$553,420 95	
Less interest and sinking fund, paid in 1887 but not in 1888, out of the current receipts	290,500 00	
Total		$262,920 95

This change of balance from the debit to the credit side of the ledger, amounting to $628,590.84, arises solely from the economical management introduced in 1887 and continued during the past year, and from the introduction of labor-saving machinery and modern processes of making gas. It does not include, however, any advantages from the new gas works constructed under the contract with the Philadelphia Gas Im-

provement Company, under which no gas was received during the past year.

If to these figures is added the sum of $804,237.12 as the value of the 536,158,081 feet of gas delivered free of cost to the various city departments and for lighting the city, some approximate idea is reached as to the value of the works at the present time, and as to their increased value in the immediate future, and this value must be taken into account when the question of leasing or selling the works is again presented to Councils, under a scheme now being "promoted" by certain prominent citizens.

The amount of coal carbonized, of gas manufactured, and its final disposition, for the past two years, is as follows:

Year.	Coal carbonized. Pounds.	Gas Per Pound of Coal.	Gas Made. Cubic feet.
1887	671,631,600	4.697 +	3,154,842,000
1888	673,748,735	4.701 +	3,209,874,000

	1887. Cubic feet.	1888. Cubic feet.
Stock delivered and unpaid for and on hand, January 1st	**430,413,600**	**448,607,400**
Manufactured during the year	**3,154,842,000**	**3,209,874,000**
Total to be accounted for	**3,585,255,600**	**3,658,481,400**

	1887.		1888.	
	Cubic feet.	Per ct.	Cubic feet.	Per ct.
Delivered to private consumers and paid for	2,163,156,100	60.36	2,168,398,600	59.27
Delivered to consumers, but not paid for, and in holders December 31	448,607,400	12.51	454,344,800	12.42

Public lighting, viz.:	1887. Cubic feet.	1887. Per ct.	1888. Cubic feet.	1888. Per ct.		
Bureau of Police	8,762,600	00.24	9,385,700	00.25		
Bureau of Fire	5,843,500	00.16	6,320,800	00.17		
Bureau of Water	2,067,600	00.06	2,167,500	00.06		
Public Buildings	8,272,100	00.23	10,650,900	00.29		
Almshouse	9,798,600	00.27	10,782,100	00.30		
City Property	6,356,200	00.18	15,016,800	00.41		
Public Squares	19,124,000	00.53	23,393,400	00.64		
Park Commission	200,100	00.01	266,400	00.01		
Schools	5,517,000	00.15	6,213,700	00.17	65,941,700	01.83	84,197,300	02.30
Street lamps					440,558,181	12.28	451,960,781	12.35
Used at works, offices, stations, etc.					25,651,800	00.71	28,843,900	00.79
Unaccounted for, leakage, etc.					441,340,419	12.31	470,736,019	12.87
Total					3,585,255,600	100.	3,658,481,400	100.

	1887. Cubic feet.	1888. Cubic feet.
Largest production of gas in any 24 hours	*12,821,000	†13,191,000
Largest consumption in any 24 hours, December 24	13,415,000	14,454,000

	Bushels.	Bushels.
Quantity of coke on hand January 1, 1887	15,200	2,700
Made during the year	9,467,785	9,378,876
Total	9,482,985	9,381,576

*† On December 23d and 24th.

	Bushels.	Bushels.
Coke sold during the year	5,053,425	4,641 266
Breeze sold during the year	480,370	461,500
Used under retorts	3,450,971	3,522,634
Used under boilers and lime-kilns	416,594	409,085
In offices, yards, and in pipe-laying	78,925	82,246
On hand December 31	2.700	264,845
Total	9,482,985	9,381,576

	1887.	1888.
Number of meters introduced during the year	4,263	4,829
Total in use	117,546	122,375
Services introduced during the year	8,546	8,302
Total in use	129,788	138,090
Lights added during the year	94,400	111,540
Total in use	1,980,999	2,092,539
Total number of consumers	118,664	122,427
Number of public lamps	16,473	17,261

The following is a table of the cost, for the past five years, of 1,000 feet of gas at its several stages of manufacture and delivery:

	Cubic feet.	In holders.	Delivered to consumers.	Extensions.	Total.
1884	2,557,678,000	73 cts. —	$1 09 +	22 cts. +	$1 31
1885	2,757,844,000	70 " —	1 03 +	16 " +	1 19
1886	2,946,407,000	70 "	1 06 +	11 " +	1 17
1887 (3 mos.)	941,415,000	97 " —	1 30 —	10 " —	1 40
1887 (9 mos.)	2,213,427,000	67 " —	97 +	07 " —	1 04
1888	3,209,874,000	66 "	91 +	11 " +	1 02

"In holders" represents amount of payments for manufacture of gas.

"Delivered to consumers" represents amount of payments for manufacture of gas and all other payments except extensions.

"Extensions" represents amount of payments for works, mains and services, less receipts on these accounts.

This is interesting, but perhaps misleading, unless considered in connection with the fact that the city receives cash, at the rate of $1.50 per 1,000 feet, in any current year for only 60 per cent. of the total manufacture, the output being as follows:

Used at the works	.79 per cent.
Unaccounted for, leakage, etc	12.87 "
Supplied to the city free of cost, for public lighting,	12.35 "
Supplied for public buildings, schools, squares, etc..	2.30 "
In holders and on bills not due	12.42 "
Sold and paid for	59.27 "
Total	100.00 per cent.

An analysis of the receipts and expenditures for the past year, the most profitable year in the history of the works, shows that the receipts from gas alone exceeded the current expenditures only $173,556.80, and that they were not sufficient by $40,609.70 to pay both these and the sums expended for extensions, and that the actual profits were practically the sums received from the sale of the residuals.

Under the contract made with the Philadelphia Gas Improvement Company, the city will have gas put into her holders for 37 cents per 1,000 feet, but calculations based upon this price, or even upon the cost at which coal gas is now being made, and upon the price paid by the consumer, not taking into account the foregoing data, will result in very disastrous financiering.

A simple subtraction of 37 from 150, and a multiplication of the remainder by the gas made or bought, without considering the value of the gas necessarily lost in distribution, and the cost of such distribution, as well as the value of the gas used by the city and not paid for, will look well on paper but will not stand the test of actual operation.

Summary of Receipts and Expenditures.

	1887.	1888.	Remarks.
Total receipts, first three months.....	$1,338,818 88		
Total receipts, last nine months.....	2,477,822 21		
Total for the year.....	$3,816,641 09	$3,875,383 69	
Total expenses, first three months.....	$1,319,957 19	*$3,107,796 24	*Current Expenses.
Total expenses, last nine months.....	2,314,711 92	†214,166 50	†Extensions.
Total.....	$3,634,669 11		
One year's interest and Sinking Fund on Gas Loan.....	290,500 00		
	$3,925,169 11	$3,321,962 74	

No serious accident of any kind happened during the year, notwithstanding the fact that our manufacturing capacity was strained to its utmost for many days in December, a condition of affairs not likely to occur again at an early day, the plant of the Philadelphia Gas Improvement Company supplementing ours to the extent of 3,000,000 feet daily, or even to a greater amount, if necessary.

The maximum capacity of all the works with all the retorts in good condition and operation is 14,100,000 feet per twenty-four hours. These figures cannot be reached in actual daily work, and the out-put of 13,191,000 feet on December 24 required very careful management, and a fortunate combination of favorable conditions not often occurring.

The following tables give in detail the capacity of the several works, and the date of construction, the location, and the capacity of all our holders:

Works.	Stacks.	Retorts per stack.	Total retorts.	Grand total.	Maximum capacity per works.	Total maximum capacity.
Ninth Ward	4	150	600			
	2	194	388			
Experimental bench	.....	.....	3	991	6,600,000	
Twenty-first Ward	1	30	30	30	200,000	
Twenty-fifth Ward	6	120	720	720	4,000,000	
Twenty-sixth Ward	4	72	288			
	2	120	240	528	3,300,000	14,100,000

There are at the Ninth Ward Works, in addition to the above, eight (8) retorts, used exclusively for vaporizing naphtha, for maintaining clear pipes about the Works.

Holders.

Location.	When Erected.	Dimensions.	Capacity.	Total.
		Feet.	Cubic feet.	
Ninth Ward	1851	140 x 70	1,000,000	
"	1871	140 x 70	1,000,000	
"	1844	80 x 40	200,000	
"	1847	80 x 40	200,000	2,400,000
Twenty-fifth Ward	1876	140 x 70	1,000,000	
"	1876	140 x 70	1,000,000	
"	1885	140 x 70	1,000,000	
"	1885	140 x 70	1,000,000	
"	1889*	140 x 70	1,000,000	5,000,000
Twenty-sixth Ward	1852	160 x 90	1,800,000	1,800,000
Twenty-first Ward		60 x 38	103,000	
"	1874	78 x 44	200,000	303,000
Frankford	1866	80 x 52	260,000	
"		50 x 16	31,000	
"		45 x 16	25,000	
"	1869	80 x 26	130,000	446,000
Bridesburg	1869	60 x 21	59,000	59,000
Ninth and Diamond	1869	140 x 70	1,000,000	
"	1874	140 x 70	1,000,000	2,000,000
Ninth and Mifflin	1874	115 x 62	600,000	600,000
Fifteenth Ward	1851	100 x 50	390,000	
"	1888	80 x 42	203,000	593,000
Germantown	1870	100 x 50	390,000	390,000
Total				13,591,000

* In process of construction.

The continued and increased use of iron sponge in purifying produces satisfactory results in the quality of the gas, in the reduction of the nuisance incident to the burning of oyster shells for lime and in a saving of money by the reduction of the number of men employed.

The use of naphtha at the Ninth Ward Works to the extent heretofore reported and for the reasons then given, continues to give satisfaction. There has been no cause for its use at any of the other works.

The introduction of "discharging machines" at the Twenty-sixth Ward Works was the cause of much adverse criticism, especially by the men whose services were no longer required because of the work done by these machines. Their work has been of such a satisfactory character that other machines will be put into operation as soon as they can be built and the retort houses and stacks adapted to their use.

The two machines already in use cost $15,000, and when the necessary rails are laid upon which they will run in front of the other stack in the retort house where they are located, the services of thirty-four men will be dispensed with. Four men are needed during twenty-four hours to run these machines, and the saving to the city in wages alone will be $81.50 daily. At present one-half of that sum is saved.

The amount of coke made is less, and the quantity on hand on December 31 greater, than in the previous year. The first is the result of the continued wet weather, and the second of the continued mild weather during the last two months of the year, when our sales were much reduced. The price of coke, which had been advanced to seven cents per bushel, was reduced one cent per bushel, and the surplus stock is being gradually sold. The difficulty of wet and dirty coal can be relieved only by the erection of additional coal sheds.

The distribution was greatly benefited by the large amount of large mains laid as follows:

Pipe Laid.

6-Inch.

Bainbridge street, from Front to Second streets	116	feet.
Allegheny avenue, from Seventeenth to west of Eighteenth sts.	640	"
Total	756	"

8-Inch.

Vine street, from Second to Front streets	616	"
Race street, from Twenty-second to Front streets	9,460	"
Market street, from Twenty-third to Thirty-second streets	3,036	"
Lombard street, from Twenty-third to Front streets	10,208	"
Fourth street, from Lehigh avenue to Clearfield street	2,256	"
Twenty-first street, Fairmount avenue, and Corinthian avenue, from Hamilton street to College avenue	4,124	"
Spring Garden street, from Broad to Twenty-fifth streets	5,108	"
Twenty-first street, from Arch to South streets	4,004	"
Marshall street, from Vine to Callowhill streets	556	"
Lancaster avenue, from Fifty-first to Fifty-second streets	256	"
Total	39,624	"

12-Inch.

Arch street, from Front to east of Fourth street	1,392	"
Market street, from Front to Thirteenth streets	5,516	"
Federal street and Grays Ferry road, from Broad to Thirty-sixth streets	9,900	"
Tioga and Venango streets, from Richmond street to Kensington avenue, via Frankford avenue	6,072	"
Total	22,880	"

20-Inch.

Front and Mifflin streets, from Chestnut to Ninth streets	12,468	"
Girard avenue and Broad street, from Front to Parrish streets	7,168	"
Total	19,636	"

The total pipe laid is as follows :

2 inch	55	feet,
3 "	13,036	"
4 "	112,532	"
6 "	756	"
8 "	39,624	"
12 "	22,880	"
20 "	19,636	"
Total	208,519	"

equal to 39½ miles, making the entire length 4,845,402 feet, or over 917 miles.

Our storage capacity has been increased by the completion at the Fifteenth Ward station, of a holder with a capacity of 200,000 cubic feet. One of 1,000,000 cubic feet capacity is now under contract and in process of construction at the Twenty-fifth Ward Works.

The candle power of the gas as tested by Dr. Charles M. Cresson and by Prof. Lemuel Stevens in 1887, averaged 17.65 candles. In 1888 it was increased to 18.54 as follows:

January	17.56.	July	18.16.
February	17.64.	August	18.92.
March	18.48.	September	18.51.
April	18.65.	October	18.52.
May	18.72.	November	18.39.
June	19.50.	December	19.46.

Among the needs of this Bureau named in my previous report, the first and most important was increased production of at least 3,000,000 feet per day. This subject was then under consideration by Councils, and resulted in the adoption of an ordinance authorizing you to advertise for bids and to make contracts for this quantity of gas. The contract was finally made with the Philadelphia Gas Improvement Company, upon the terms and conditions fully set forth in the papers attached to this report, and it is expected that gas will be made and delivered about the middle of this month.

The buildings and machinery erected by the company are of the most substantial character, with a capacity largely in excess of that named in the contract.

There appears to be no doubt as to the character of the gas to be furnished, and the whole transaction will be likely to prove profitable to the city.

Under the terms of the contract the city can, whenever in funds, take these works at a valuation by arbitrators and at a price not exceeding that named in the contract as the estimated first cost of the plant.

With the appropriation for extensions made for 1889, and the balance carried over from the appropriation for the past year, it is proposed to do the following work:

Build a holder at Ninth and Mifflin streets station of 1,000,000, or of 1,500,000 feet capacity.

Lay a 30 and 20-inch main from the Twenty-sixth Ward Works along the line of Passyunk avenue, Broad street, and Mifflin street to the above holder.

Lay a 16-inch main from Sixteenth street and Snyder avenue along said avenue and Ninth street to the same place, and extend the 30-inch main on Broad street north as far as the money in hand will permit.

Erect additional boilers, and boiler, engine and exhaust house, with needed exhausters, at the station at Ninth and Mifflin streets.

Rebuild the stack in retort house No. 2, Twenty-sixth Ward Works, with benches of 6's in place of 3's now there.

Erect an iron shed for the storage of coal and of iron sponge, and put up a large air condensing main at the Ninth Ward Works, and relay the old brick and stone pavements at the several works with granolithic pavement.

The principal offices of this Bureau were removed, during the past year, to the large building at the northeast corner of Filbert and Juniper streets, a location convenient of access, and also in close proximity to other important city departments.

CONTRACT WITH THE PHILADELPHIA GAS IMPROVEMENT COMPANY.

KNOW ALL MEN BY THESE PRESENTS, That We, The Philadelphia Gas Improvement Company, principal, and the American Surety Company, surety, are jointly and severally held and firmly bound unto the City of Philadelphia, in the sum of one hundred thousand (100,000) dollars, lawful money of the United States of America, to be paid to the said

City of Philadelphia, its successors and assigns, to which payment well and truly to be made, we do bind ourselves and each of us, our and each of our successors and assigns, jointly and severally, firmly by these presents.

Sealed with the corporate seal of the said The Philadelphia Gas Improvement Company, and with the corporate seal of the said The American Surety Company, duly attested by the proper officers thereof, dated the third day of August, in the year of our Lord one thousand eight hundred and eighty-eight (1888.)

WHEREAS, The above bounden the Philadelphia Gas Improvement Company, in and by its certain contract of even date herewith with the City of Philadelphia, agrees to erect, at its own expense, on the land of the said City of Philadelphia, at the Twenty-fifth Ward Gas Works, the necessary plant for the manufacture of illuminating gas, under the process known as "Hydro-carbon or Water-gas," by the Hanlon and Leadley W. Improved Apparatus, and to furnish and deliver to the said city the said illuminating gas in strict and exact accordance with the ordinance of Councils, approved April 6, 1888, the advertisement, proposal, specifications, and drawings, attached to, and made a part of the said contract and certain plans on file in the office of the Director of the Department of Public Works.

Now the condition of this obligation is such that if the said The Philadelphia Gas Improvement Company shall, and do well and truly, in all respects, comply with all the terms, conditions, and covenants, contained and set forth in the said contract, ordinance, advertisement, proposal, specifications, drawings, and plans, and shall, and do save, protect, and indemnify the said City of Philadelphia of, from, and against all loss, damage, or expense by reason of its failure to comply with the said contract, ordinance, advertisement, proposal, specifications, drawings, and plans, then this obligation to be void, otherwise to be, and remain in full force and virtue.

We further agree, that if in the opinion of the Director of the Department of Public Works, of the said city, any default shall happen on the part of the said The Philadelphia Gas Improvement Company, we will pay all loss occasioned thereby, and that the ascertained amount thereof which shall be determined by the said Director, and of the truth of which oath and affirmation shall be hereto made by the said Director shall be final and conclusive upon us, and that execution may forthwith issue against us for the amount of the said default.

PHILADELPHIA GAS IMPROVEMENT COMPANY,
WM. L. ELKINS, JR.
[SEAL.] *President.*

AMERICAN SURETY COMPANY OF NEW YORK,
By
HENRY D. LYMAN,
Vice-President.
FRED. F. NUGENT,
Secretary.

Sealed and delivered in the presence of us.
H. G. HINTON,
As to American Surety Company.
[SEAL.] Witness as to Philadelphia Gas Improvement Co.
LEWIS E. BEITLER.

Attest:
R. F. BOWER,
Secretary.

THIS AGREEMENT, made this third day of August, in the year of our Lord one thousand eight hundred and eighty-eight, between the City of Philadelphia of the one part, and "The Philadelphia Gas Improvement Company," a corporation duly chartered under the laws of the State of New Jersey, of the second part.

WHEREAS, By an ordinance of the said City of Philadelphia entitled "An Ordinance to authorize the Mayor to enter into a contract or contracts for an increased supply of gas," and duly approved the sixth day of April, A. D., 1888, the Mayor of said city was duly authorized to enter into a contract with a competent person, firm, or corporation for the manufacture and delivery into the holders of said city of an additional supply of illuminating gas, upon certain terms and conditions which are herein set forth (a copy of which said ordinance is hereto attached, marked "Schedule A," and hereby made a part of this agreement);

AND WHEREAS, In pursuance of said ordinance, the Mayor of said city did duly advertise according to law for sealed proposals from parties desiring to become bidders for said contract for furnishing said additional supply of illuminating gas, and did duly furnish to parties desiring to become bidders as aforesaid certain printed specifications and instructions to bidders (a copy of which said printed specifications and instructions to bidders is hereto attached, marked "Schedule B," and hereby made a part of this agreement);

AND WHEREAS, The said "The Philadelphia Gas Improvement Company" did duly become a bidder for said contract, and did duly file with the Mayor of said city its certain written sealed proposal for furnishing said additional supply of illuminating gas upon the terms and conditions contained in said ordinance, and in accordance with the said printed specifications and instructions to bidders, which said proposal was accompanied with certain plans and drawings, showing the nature and character of the works and buildings proposed by it to be erected for the purpose of manufacturing said additional supply of illuminating gas (a copy of which said written proposal is hereto attached marked "Schedule C," and together with said plans and drawings, now in possession of said city, are hereby made a part of this agreement);

AND WHEREAS, The Mayor of said city, after having duly and publicly opened, on the day fixed therefor, all the sealed proposals received by him from bidders for said contract, did duly and publicly award the said contract for said additional supply of illuminating gas to the said "The Philadelphia Gas Improvement Company" upon its said proposal to erect the buildings, works, machinery and appliances described therein and shown in the said plans and drawings accompanying the same, and to manufacture the said additional supply of illuminating or hydro-carbon gas by a certain process known as "The Hanlon and Leadley W. Improved Apparatus," and to deliver the same into the holders of the said city for the price of thirty-seven (37) cents per thousand cubic feet (said price being the lowest and best price for which it was offered to furnish said additional supply of illuminating gas in any of said bids or proposals), and under and subject to all the terms, conditions and penalties contained in said ordinance, and in accordance with said printed specifications and instructions to bidders, and the said proposal of the said company.

NOW, THEREFORE, *In furtherance of the above-recited premises, and in order to carry out the purposes of said ordinance, this agreement witnesseth:*

1. That the said City of Philadelphia, on the one part, and the said "The Philadelphia Gas Improvement Company," on the other part, do hereby mutually contract, the one with the other, for the manufacture and delivery by the said "The Philadelphia Gas Improvement Company" into the holders of the said city, of the said additional supply of illuminating gas provided for in said ordinance and in accordance with the above-recited premises; said gas to be made by the process known as "The Hanlon and Leadley W. Improved Apparatus," and to be delivered into the holders of the said city of the quality and in the quantities and upon the terms and conditions in the said ordinance specified, and at the said price of thirty-seven (37) cents per thousand cubic feet; and for the

acceptance thereof and the payment therefor by the said City of Philadelphia; and it is hereby mutually agreed that the terms and conditions of this contract are fully and explicitly stated in (1) the said ordinance of the City of Philadelphia, approved the sixth day of April, A. D. 1888; (2) the said printed specifications and instructions to bidders prepared by the Mayor of said city in pursuance of said ordinance; and (3) the said written proposal of the said "The Philadelphia Gas Improvement Company" (together with the said plans and drawings which accompanied the same and which are now in the possession of said city), which was duly accepted by the Mayor of said city as hereinbefore recited, copies of all which are hereto attached and marked respectively (1) "Schedule A," (2) "Schedule B," and (3) "Schedule C," which said three schedules, it is hereby agreed, shall be read and taken as parts of this agreement, with like force and effect, as if the same were set forth at large in the body hereof.

2. That the said "The Philadelphia Gas Improvement Company" agrees to construct at the Works of said city in the Twenty-fifth Ward, all the buildings, works, machinery and appliances necessary for manufacturing said additional supply of gas, and which are described in Schedules B and C, and shown in the said plans and drawings accompanying the said proposal in exact conformity in all respects with the said proposal and the plans and drawings accompanying the same (excepting a certain modification as to foundation, which modification has been assented to by the Mayor of said city, and is shown in two letters hereto attached, marked "Schedules D and E," which are made a part of this contract), and agrees to have said buildings, works, machinery and appliances fully completed and ready to begin the manufacture and delivery into the city's holders of the said additional supply of gas within five months from the date hereof; and further agrees upon six months notice to erect at any other of the City's Gas Works the necessary works, machinery and appliances for manufacturing additional amounts of gas required by the city

to be furnished upon the same terms and conditions as herein contained.

3. That the said "The Philadelphia Gas Improvement Company" agrees to keep and perform each and every promise and undertaking on its part contained in its said written proposal, as it appears in Schedule C, taken and read in connection witn Schedules A and B; and further agrees to be bound by all the terms, conditions, liabilities and penalties therein contained; and further agrees that upon the termination of this contract the said City of Philadelphia shall have the right to purchase the license to use the said "Hanlon and Leadley W. Improved Apparatus" in any or all of its Gas Works for a price to be determined in the manner in said ordinance provided, or in consideration of the payment by the said city to the said "The Philadelphia Gas Improvement Company" of a royalty of two-and-a-half cents per thousand cubic feet of gas manufactured by said process under said patents.

4. That the said City of Philadelphia agrees, during the continuance of this contract, to pay to the said "The Philadelphia Gas Improvement Company" at the rate of thirty-seven (37) cents for each thousand cubic feet of gas delivered into the holders of the said city in pursuance of this contract, said payment to be made at the time and in the manner specified in the said ordinance; and further agrees to keep and perform each and every promise and undertaking in said ordinance specified to be by it kept and performed; and further agrees to do all that may be reasonable and necessary to enable the said "The Philadelphia Gas Improvement Company," on its part, to faithfully carry out its contract.

5. That the said party of the second part further contracts and agrees to properly enclose the work to be done under this contract and to place signal lights thereon all night when and where necessary, and to be responsible for, and pay all loss and damage which may in any manner arise by reason of the performance of said contract during the progress of the same.

6. The said party of the second part agrees not to assign or

sublet this contract, and any assignment, subletting, or any judgment, levy or sale shall annul this contract and forfeit the work erected under it to the party of the first part.

7. It is further understood and agreed that this contract is entered into under and subject to the provisions of the Act of Assembly of the Commonwealth of Pennsylvania, entitled "An Act to provide for the better government of cities of the first class in this Commonwealth," approved the first day of June, A. D. 1885.

8. This contract, subject to the city's right to terminate it at any time in the manner provided in said ordinance, shall continue for one year from the time when the party of the second part begins the actual delivery of gas into the city's holders, with the privilege to the city of renewal from year to year; and unless the city shall give sixty days notice prior to the end of any year of its intention not to exercise its said privilege of renewal for another succeeding year, it shall be taken as continuing in force from year to year until such notice shall be given.

IN WITNESS WHEREOF the corporate seal of the City of Philadelphia, party of the first part, hath been hereto affixed, duly attested by the Mayor of the said city, and the corporate seal of the said "The Philadelphia Gas Improvement Company," party of the second part, hath been hereto affixed, duly attested by the proper officers thereof, the day and year first above written.

The word "August" on first line of first page having been first written in place of "July," and the word "third" in place of "fourth."

[SEAL.]

EDWIN H. FITLER,
Mayor.

PHILADELPHIA GAS IMPROVEMENT COMPANY,

[SEAL.]

WM. L. ELKINS, JR.,
President.

Attest: R. F. BOWER,
Secretary.

Witnessed as to both parties to the contract:

JAS. R. CALHOUN,
LEWIS E. BEITLER.

Approved as to form:
CHAS. F. WARWICK.

This fourth day of August, 1888, in compliance with Art. VII., Sect. 1, Clause VII. of the Act of Assembly, approved June 1, 1885, I endorse upon the within contract as follows:

No liability on the part of the City of Philadelphia until an appropriation by Councils first be made.

ROBERT P. DECHERT,
City Controller.

SCHEDULE A.

AN ORDINANCE.

To authorize the Mayor to enter into a contract or contracts for an increased supply of gas.

SECTION 1. *The Select and Common Councils of the City of Philadelphia do ordain*, That the Mayor be, and he is, hereby authorized to enter into a contract or contracts for one year, with a privilege of renewal from year to year, with a competent person, firm or corporation, for the manufacture and delivery into the city's holders of not exceeding three million (3,000,000) cubic feet of illuminating gas per diem, and as much more as the city may desire to take from such contractors: *Provided*, That said contractor shall not be required to furnish more than three million (3,000,000) cubic feet per diem, unless six (6) months' notice shall first be given to enable them to provide the apparatus necessary to supply the additional amount. All gas furnished under said contracts shall be of candle power not less than twenty-two (22) sperm candles, as tested at any point within said city where said gas is exclusively distributed, at a price not more than

fifty (50) cents per thousand (1000) cubic feet, the city to be at no expense for buildings, machinery, labor or material. The necessary works for the generation of said gas shall be erected at such place or places as may be furnished by the city and selected by the Mayor and the Director of the Department of Public Works. The amount of gas furnished shall be measured by meters supplied by the city through which the same is delivered into the city's holders. The payment therefor shall be made monthly on the certificate of the Chief of the Bureau of Gas, approved by the Director of the Department of Public Works. The city shall at all times have the right and authority by its proper officers or by an expert to inspect the works and the quality of gas furnished, and for every candle power less than twenty-two (22) candle power five (5) cents per thousand (1,000) cubic feet shall be deducted for all gas furnished during the period of thirty (30) days preceding the inspection, and such inspection or test shall be made at least once in sixty (60) days. It is further agreed that the contractor or contractors, their successors, executors or administrators, shall at all times and without interruption or delay furnish to the City of Philadelphia all gas according to the terms of their contract, notwithstanding any non-payment by the city or any difference between them, and any violation of this condition shall forfeit the works and all appliances, and the city may at once enter upon the same and take possession thereof: *Provided*, That this shall not debar the contractor or contractors of any right to compensation for any sums due by the city for gas already supplied.

SECT. 2. The contractors shall give security in the sum of one hundred thousand (100,000) dollars satisfactory to the City Solicitor to guarantee the faithful performance of the contract, both as to the time of the erection of the said works and as to the quality and quantity of the gas to be furnished. The city shall not be liable for damages in any way or from any cause in connection with the erection of buildings or ma-

chinery, or in connection with the manufacture of said gas and its delivery into the city holders, and the contract shall provide proper penalties for any delay or failure of the contractors to furnish the gas as contracted for. The city shall have the right at any time during the continuance of the contracts or their renewals to terminate the said contracts absolutely or to purchase the works and machinery which may be erected under said contracts, together with the patent rights necessary to secure to the city the use of the same within its territory, at a price which shall be ascertained by three (3) appraisers, one (1) to be chosen by the city, one (1) by the contractor and the third by the two (2) so chosen: *Provided*, That the maximum price at which the patent rights shall be purchased shall be inserted in the contract.

SECT. 3. The Mayor shall make advertisements required by law asking bids from responsible parties having in actual and successful operation processes for making gas. No proposal shall be received or considered unless the same shall be accompanied by a bond in the sum of fifty thousand (50,000) dollars, with two sureties, to be approved by the Mayor and City Solicitor, and conditioned that on the failure or refusal within thirty days of the party making such proposal to enter into and accept said contract, and keep and perform all the conditions and terms therein contained in the event of the same being awarded to him or them, the amount of said bond shall be paid to the City of Philadelphia as liquidated damages. All proposals shall be received by the Mayor within sixty days after the approval of this ordinance, and within thirty days after the receipt of said proposals he shall award said contract to the lowest responsible bidder, and shall immediately thereafter report to Councils the result of his decision and award. All Ordinances or parts of Ordinances inconsistent herewith be, and the same are, hereby repealed.

Approved the sixth day of April, A. D. 1888.

EDWIN H. FITLER,
Mayor of Philadelphia.

SCHEDULE B.

SPECIFICATIONS FOR FURNISHING ILLUMINATING GAS TO THE CITY OF PHILADELPHIA.

1. The quantity required is not exceeding 3,000,000 cubic feet per day, but for any quantity in excess of that figure six months' notice must be given the contractor.

2. The gas must be of an illuminating power of not less than 22 sperm candles, and for every candle power less than that figure, as shown by the standard tests of the Philadelphia Gas Works, five cents per 1,000 cubic feet shall be deducted from the contract price for all gas furnished for the 30 days preceding the day when such deficiency was found.

3. The manner and conditions of the tests, whether for illuminating power or for purity, shall be under the sole control of the City of Philadelphia, and shall be made by employés or experts selected by the Director of the Department of Public Works of the said city, and their reports shall be conclusive and accepted as final by the contractor.

4. The maximum per cent. of carbonic oxide to be contained in the gas furnished shall be named in the contract.

5. The amount of gas furnished shall be determined by the meters supplied by the City of Philadelphia, and through which it passes to the city's holders. The reading of the meter dials and determining of the quantity of gas delivered shall be done by proper officers of the Bureau of Gas, and their report, shall be final.

6. The necessary plant for the first 3,000,000 cubic feet shall be erected on the city's land at the Twenty-fifth Ward Works, without expense to the city for either buildings, machinery, labor, or material, whether in the construction of the plant or the manufacture of the gas, the latter becoming the city's property when it has passed the meters placed for its measurement. For any gas in excess of such amount the

plant shall be erected at such points as the Mayor of the city shall designate.

7. The buildings to be erected must conform in general character to those now on the ground.

8. The contractor shall be liable for any and all damages done to either the city or to individuals in the construction or the operation of the works.

9. The contract shall continue for one year from the date of the first delivery of gas, with the privilege, to the city, of renewals from year to year.

10. The city shall have the right at any time, or for any cause, to terminate any contracts absolutely or to purchase the plant, together with the patent rights necessary to manufacture the gas, at a price to be fixed by appraisers chosen in the usual manner.

11. The maximum price to be charged for the use, in the city's gas works, of any appliances covered by patents shall be named in the contract.

12. The city's officials, or experts employed by them, shall have the right to inspect the plant, the materials and supplies, or the gas manufactured, at any time and in any manner deemed necessary by them.

13. Failure to furnish the gas contracted for in proper quantity or quality, no matter for what cause, shall forfeit the plant to the City of Philadelphia, whose officials may at once enter upon and take possession of the same.

14. The ground of the city shall be surrendered, and all buildings, machinery, and appliances erected thereon, and all materials shall be removed within 90 days from the termination of any contract, unless they shall have been previously purchased by or forfeited to the city as hereinbefore provided.

15. Security for the faithful execution of the contract in the sum of $100,000 will be required.

16. No bid exceeding 50 cents per 1,000 cubic feet will be considered.

Instructions to Bidders.

1. Bids must be in writing, placed in sealed envelopes, addressed

"BIDS FOR GAS."

EDWIN H. FITLER,

Mayor,

Philadelphia,

and will be received until 12 M., June 5, 1888.

2. Each bid must be accompanied by a bond in the sum of $50,000, with two sureties to be approved by the Mayor and the City Solicitor, conditioned that upon the failure of the bidder whose proposal is accepted to enter into a contract with the City of Philadelphia, within 30 days of the day of acceptance, or subsequently, to keep and perform the conditions of such contract, the amount of the bond shall be paid to the city as liquidated damages.

3. Bidders must submit detailed drawings and specifications of the works and buildings they propose to erect, with an estimated cost of the same, and, also, full description of the processes by which the gas is to be manufactured, and of all patents covering appliances to be used in such manufacture.

4. Bidders must state
   - *a.* The style and title under which the gas manufactured by them is generally known.
   - *b.* Where their processes are in actual and successful operation.
   - *c.* When these operations were begun, and
   - *d.* Where and when their processes have heretofore been used.

5. Bidders must state
   - *a.* The candle power of the gas to be furnished.
   - *b.* The maximum per cent. of carbonic oxide found in the gas manufactured by their process.

c. The price per 1,000 cubic feet for the first year, and for any subsequent year of the renewal of the contract, and

d. The maximum price of any appliances covered by patents used in the manufacture of the gas offered

1. In the plant erected by the bidders, and
2. In any or all of the gas works of the city.

6. Bidders must state

a. When they will begin work if the contract is awarded them, and

b. When they will deliver the first gas into the city's holders.

7. Payments for the gas delivered will be made monthly on the fifteenth day of each month by warrant on the City Treasurer.

The foregoing specifications and instructions to bidders are based upon an ordinance entitled "An Ordinance to authorize the Mayor to enter into a contract or contracts for an increased supply of gas," approved April 6, 1888, a copy of which is hereto appended and made a part hereof, and bids will be received or rejected according to its provisions, whether or not they are specifically set out in these "Specifications or Instructions."

EDWIN H. FITLER,

MAYOR'S OFFICE, *Mayor.*

Philadelphia, April 14, 1888.

SCHEDULE C.

Philadelphia, June 5, 1888.

HON. EDWIN H. FITLER, MAYOR
City of Philadelphia.

DEAR SIR:—In accordance with the enclosed advertisement for proposals and your specifications and the ordinance of Councils approved April 6, 1888, we have the honor to submit the following proposal for furnishing illuminating gas to the City of Philadelphia, and enclose the required bond, in the sum of fifty thousand dollars, duly approved, as security for the good faith of our bid.

As required, we submit herewith detailed drawings and specifications of the works and buildings we propose to erect at the Twenty-fifth Ward Works in accordance with your specifications, with an estimated cost of the same, also full description of the processes by which gas is to be manufactured, and of all patents covering appliances to be used in such manufacture, numbered as follows: 311,124; 300,602; 289,-282, and 289,277.

The style and title under which the gas manufactured by us is generally known is "Hydro Carbon" or "Water Gas," by the Hanlon & Leadley "W" improved apparatus.

This process is in actual and successful operation in the City of Reading, Pa., since 1886, and in Ardmore, Pa., since February, 1887. It is, however, an outcome of and an improvement upon the Hanlon & Leadley "U" process, which is the most successful Water Gas process in operation anywhere, excepting the "W" process herein offered, and has been, and is now, in actual and successful operation in the following places: Passaic, N. J., 1883; Flint, Mich., 1884; Owosso, Mich., 1885; Chicago Gas Light and Coke Co., Ill., 1886; South Chicago Gas Light Co., Ill., 1886; Ottowa, Kansas, 1886; Grand Island, Nebraska, 1887.

These processes were begun and have heretofore been used, as above stated. All of the above are in successful operation,

giving the best results of any known process except those in use at Reading and Ardmore. The apparatus used at Reading is a duplicate of the ones which we propose to erect for your city. With the Hanlon & Leadley "W" process the gas made is of a uniform standard, and there is less condensation than by any other process known, perfect decomposition of steam being effected, as the steam before coming in contact with the incandescent coal is highly heated by being passed through separate superheaters which were previously heated by the waste products of combustion. The superheated steam then passes through the two fires and up through the third, and is thoroughly decomposed before coming in contact with the oil, thereby insuring a perfect fixed gas, as the mixture passes to the fixing chamber, where all the gases are fixed. With the apparatus we propose to erect for you it is important to call your special attention to the fact that we have thoroughly demonstrated that any kind of heavy and cheap petroleum oils can be successfully used, hence we are not confined to the use of a special grade of oil or to the dangers incident to the storage of large quantities of naphtha.

We propose to erect buildings and plant of ample capacity to more than fulfill the requirements, as reference to our detail drawings and specifications as numbered from one to eleven will show. We propose to erect twelve (12) sets of generating apparatus complete, each guaranteed to produce four hundred thousand cubic feet of gas in twenty-four hours. Thus, only eight of these will be required to be in operation at one time, leaving four extra ones, or one-third of the whole, to resort to in any case of emergency. The same may be said of our purifiers and our pumps for water and oil, also our buildings for the storage of coal, and our tanks for the storage of oil and water. They are all of a capacity beyond the actual requirements, and in the case of the pumps and the purifiers, as with the generators, there will be spare ones for use in cases of emergency.

The gas furnished by us from this process shall not be less

in illuminating power than that of twenty-two (22) Standard Sperm Candles.

The maximum per cent. of carbonic oxide contained in gas manufactured by this process is twenty-four and fifty one-hundredths ($24\frac{50}{100}$), and can be reduced to twenty (20).

We will furnish three million (3,000,000) cubic feet of gas, and as much more as is required, upon six months' notice, by the Hanlon & Leadley "W" process, of more than twenty-two (22) candle power, delivered as required to your station meter, at thirty-seven (37) cents per one thousand cubic feet for the first year, and for any subsequent year at thirty-seven (37) cents per one thousand cubic feet.

The maximum price of the appliances covered by patents used in the manufacture of gas by this process is—

1. In the plant to be erected under this bid a royalty of two and a palf cents per thousand cubic feet.

2. In any or all of the Gas Works of the City on the basis of plant of capacity of one million cubic feet per diem, as above; plant of capacity of two million feet, as above; plant of capacity of three million feet, as above; plant of capacity of five million feet, as above.

We will erect additional plants wherever required upon receiving notice in accordance with your specifications.

The buildings we propose to erect shall conform in general character to those now on the grounds.

Accompanying the specifications of our buildings are the drawings and specifications of our patents, with their numbers, to which we respectfully call your attention.

We will submit to required tests and conform to all the requirements of the specifications and ordinance should contract be awarded to us.

The estimated cost of the works for this process, two hundred and seventy-five thousand (275,000) dollars.

If awarded the contract we will commence the work immediately upon the execution of the contract, and will deliver

the first gas into the city's holders within five months of the execution of the contract.

PHILADELPHIA GAS IMPROVEMENT COMPANY,

[SEAL.] WM. L. ELKINS, JR.,
President.

Attest:
GEO. D. WIDENER,
Secretary.

SPECIFICATIONS FOR GENERATING HOUSE.

General Items.

All the plans accompanying this specification are drawn to scale, but whenever any difference may be found between the scale and figures, the work shall be built according to the figured dimensions in preference to the scale. The plans, elevations, and sections herewith furnished will give all needed information as to the general arrangement of buildings and apparatus.

Dimensions.

The inside dimensions of the building are to be as follows: Width, 80 feet; length, 140 feet; height from floor line to top of wall plate, 35 feet. The gable walls, for a distance of 8 feet on each side of the ridge pole will be carried up 4 feet above the remainder of the gable, in order to provide for ventilator. Other general features of the building can be seen by referring to the plans.

Excavating.

Trenches for foundation walls are to be carried to a depth of 4 feet below the grade line, and are to be 3 feet wide. Care will be taken to make the bottom of the trenches level, so that the walls may all start from the same line, and thereby

settle evenly, without any cracks. After the masonry is completed and has set sufficiently to allow it, the space between the wall and the bank will be filled in with dirt, which will then be rammed in solid enough to prevent any water from settling in the space between the bank and the wall.

Foundation Walls.

The foundation walls shall be 2 feet thick, composed of best native stone and cement mortar, in proportion of 2 parts sand to 1 part of cement; the portion of the wall below the grade is to be dashed, while all joints in any part that may be above grade will be neatly pointed up. The foundation walls will be supported on 2 rows of piles, each pile being 12 inches diameter, 30 feet long when required, and placed 3 feet between centres. Each row of piles to have hemlock cap 8 x 12 inches, firmly secured to the piles by wrought iron bolts $\frac{7}{8}$-inch diameter. On these 2 caps the first course of stone will be set, each stone being of sufficient size to extend the whole thickness of the wall. Foundation for generating apparatus shall rest on piles spaced as above, with hemlock caps 8 x 12 inches. On these caps, a hemlock floor 4 inches thick shall be constructed to receive the masonry. The masonry foundation shall be constructed as follows: A brick shell 13 inches thick shall be run up to floor line, and the interior filled with concrete, composed of broken stone or brick, and cement mortar. The brick walls shall then be continued the remainder of the height with a thickness of 18 inches, and the interior shall, as before, be filled with concrete to within 5 inches of the top. The last two courses of brick shall extend over the surface of the concrete, thereby forming a level brick floor, ready for the reception of the apparatus.

Brickwork.

All the walls above the foundations shall be built of brick, and the thickness thereof shall be as follows: From the stone foundations up to a height of 14 feet 6 inches the wall veil

shall be 18 inches thick, with 4½-inch pilaster, and continue from that point up to the wall plate with a thickness of 13 inches, with a 4½-inch pilaster, the ledge formed by the decrease of thickness being inside the building; pilasters and window hoods are to project 4½ inches beyond the outer face of the wall veil. For projections of the cornices, see working plans. All the brickwork shall be done with good quality hard burned brick, to be laid carefully with close joints, which are to be struck and smoothed down with the trowel. All horizontal joints will be kept straight and level. The wall shall be firmly bonded and tied by making every seventh course of headers, and care will be taken to put between these headers sufficient mortar to prevent water from driving through the wall in rainy weather. All necessary tie rods and anchors will be provided and carefully put in.

Mortar.

The mortar for the stone foundation shall be composed of well screened gravel, or sharp sand and cement. These will be thoroughly mixed, so as to form a mortar of uniform quality throughout. The mortar for the brickwork shall be composed of the best sharp screened or river sand and best freshly burned lime, in the proportions of 1 part by measure of lime to 2 parts by measure of sand. The mortar will be mixed thoroughly, so that it will be free from all lumps and be homogeneous throughout.

Stone Sills.

All window sills will be gotten out of good quality North River Blue Stone, hammer dressed, with ends knocked off square. Width, length, and depth of sills to be taken from the several drawings of the building. All sills are to project beyond the wall veil, the amount of such projection to be determined by reference to the plans. All window sills to be set with a wash between window reveals as shown. Each sill will extend beyond the reveal 2 inches into the brickwork on each end. All door sills are to be of North River Blue Stone,

hammer dressed, and extend in an amount equal to the full thickness of the wall, at the part of the building in which such sills are set. The thickness of the door sills to be taken from the plans; each sill will extend into the brickwork a distance of at least 3 inches at each end. Care will be taken to set all sills level. For detailed account of manner in which sills are to be set, see specification for condensing house. Door sills will be firmly bedded and secured, to prevent their breaking or working loose.

Window Frames and Sash.

In the first story all windows will be twins or mullioned, the mullions being of brick as shown in plan. All windows, except those in the gable end used as ventilators, are to have glazed sash, each sash having four lights. All sash are to be of well seasoned selected white pine, $1\frac{7}{8}$ inches thick, double hung with cast iron weights, and sash cord of American manufacture. Each window on the first floor is to be provided with a safety window sash lock of approved pattern. The sizes of the window frames are to be taken from the drawings. All frames to be boxed for weights, and provided with pulleys not less than $1\frac{3}{4}$ inches in diameter. They are to be made of good quality white pine, with yellow pine sills. The ventilating windows in gable ends are to be provided with slats 5 inches wide, and 4 inches apart, pivoted so that they can be closed.

Doors.

All large doors are to be in two parts, as shown on the plan, each half is to be supported on rollers moving on wrought iron track. Care will be taken to secure the track in good workmanlike manner. The rollers will be at least 4 inches in diameter. All large doors to be made of mill dressed $\frac{7}{8}$-inch tongued and grooved, and beaded lumber of good quality. Battens to be 2 x 6 inches, placed 2 feet 6 inches between centres. Small doors to be $1\frac{7}{8}$ inches thick, with panels of tongued and grooved material, hung with iron butts $3\frac{1}{2}$ x $3\frac{1}{2}$ inches, and provided with lock and key complete.

Hardware.

Each window on the first floor to be provided with one safety window lock of approved pattern. Sash pulleys are to be not less than $1\frac{3}{4}$ inches in diameter, and set in the plane of the sash. Each door is to be provided with track of good wrought iron firmly secured, and rollers 4 inches in diameter. Each door is also to have one heavy lock of approved make, with handles, escutcheon, key, etc., complete. Each half of the door to be provided with one bolt, not less than a half inch diameter. Small door to be hung with $3\frac{1}{2}$ x $3\frac{1}{2}$ plain japanned iron butts, and be provided with mineral knobs, lock, escutcheon, and key complete.

Painting and Glazing.

Sash, window frames, doors, etc., shall receive three coats of paint, composed of linseed oil, white lead, and colors of best quality. All tints and colors are to be such as may be selected by the city, and, if they fail to select the same, the builder shall be at liberty to choose such tints and colors as he may think most appropriate. After the first coat or priming is put on, all cracks and nail holes will be puttied up, with putty composed of linseed oil and whiting. All iron work of the roof is to receive two coats of the best approved brand of metallic roofing paint.

All glass in the building to be of American manufacture, of good quality, free from wind cracks, large bubbles, or other serious defects. Firmly fastened into the sash and carefully back puttied.

Roof.

The roof will be constructed of iron, so combined as to give great strength and solidity. The trusses being constructed according to Fink's design, and it will be guaranteed to be capable of carrying a load of 40 pounds per square foot of area. All wrought iron bolts, tie rods, trusses, etc., shall be of a tensile strength of not less than 50,000 pounds per square inch of sectional area.

Slate.

The roof will be covered with good quality merchantable slate 12 x 24 inches, laid with 3-inch lap, and secured firmly to the purlines with copper wire, and guaranted weather proof. Care will be taken to have the slate laid in straight lines.

Floors.

The ground floor shall be carefully paved with brick; the second floor will be constructed of wood and iron supported by iron beams, sufficiently strong and durable, as per plans.

Ventilator.

The ventilator shall extend 4 feet above the remainder of the roof. The sides shall be filled with louvre boards, not less than 5 inches wide, and set at an angle of not less than forty-five degrees.

Elevator.

This building shall be provided with a hydraulic elevator of approved pattern, strongly and substantially built. The elevator shall be 8 feet square, and be capable of lifting 35 feet.

Smoke Funnels.

The smoke funnels shall be constructed of No. 10 sheet iron, and be firmly secured in place. There shall be 5 funnels to each apparatus.

Crown Moulds and Lead.

The crown moulds shall be of galvanized iron, firmly secured. All leads are to be of corrugated galvanized iron, 5 inches in diameter.

Generating House.

This building will contain 12 complete sets of generators, super-heaters, fixing-chambers, and wash-boxes, as shown in detail in working plans.

Apparatus.

The generating apparatus will consist of 12 sets of Hanlon & Leadly W apparatus; each set is composed of 1 triple generator made of ¼-inch tank iron, well riveted and caulked, the sides to be braced with double angle and flange iron; all angles to be of the best quality well put together, so as to assure all gas tight; the tops of each set to be ⅜-inch steel plates, with 3-inch angle iron to stiffen each opening. The connecting cylinders to be made of ¼-inch tank iron, all well and thoroughly put together. The super-heaters and fixing chamber to be of ¼-inch tank iron, with the necessary connections, doors, etc., all as shown on plans. Each set to have its own and separate washer, so that any set can be repaired, no matter when or where located, and at the same time will not interfere with or retard the gas-making department.

The generators, connecting cylinders, super-heaters, and fixing chamber, to be lined with the best fire brick and fire clay in the most approved manner; each set of apparatus to be provided with convenient doors and openings to enable quick and rapid progress for cleaning, all provided with valves, gauges, etc., to entirely complete the same.

SPECIFICATIONS FOR ENGINE AND BOILER HOUSE.

General Items.

All the material herein specified for the erection and completion of Engine and Boiler House shall be of good quality, and all the work shall be done in a good workmanlike manner. All blocks, broken stones, bricks, etc., left from the construction of the building shall be removed from the grounds.

Dimensions.

The length of the building, inside measurement, shall be 105 feet, width 34 feet, height to wall plate 22 feet, the ridge

pole being 11 feet higher. The building shall contain an office and testing room, an engine and blower room, and a boiler room; each room being separated from the others by 9-inch brick wall. The boiler stack shall be 10 feet 6 inches square at base, 7 feet 6 inches square at top, and 75 feet high. The floor of boiler room and engine room shall be 4 feet below grade.

Excavating.

Trenches for foundation walls shall be carried 5 feet below grade. The boiler and engine rooms shall be excavated to a depth of 4 feet below grade. Foundation for engines, boilers, and blowers shall extend 4 feet below the floor line, or 8 feet below grade.

Foundations.

The foundation walls shall be 16 inches thick, and be constructed of first class native stone and cement mortar. The stone shall be shaped with the hammers so that it can be bedded firmly. The face of the wall below grade shall be dashed, while any joints above grade shall be neatly pointed up. Foundations for engines, boilers, and blowers shall be built of stone or brick, and cement, and extend 4 feet below floor line.

Brickwork.

All the walls above foundations shall be built of hard-burned brick of good quality, and be 9 inches thick, with the addition of brick pilasters 4½ inches thick, and 2 feet six inches wide. Window hoods shall project 4½ inches beyond the wall veil. All brick will be laid with close joints which are to be struck and smoothed off with the trowel. All horizontal joints shall be kept level, and the walls will be firmly tied by making every seventh course of bricks a row of headers. No bricks defective in color or shape will be allowed in the outer face of the wall.

Mortar.

All brickwork shall be done with mortar composed of two parts of the best sharp screened or river sand to one part of

freshly burnt lime. The mortar will be mixed until it is of homogeneous quality throughout. The stone foundations shall be built with mortar composed of cement, and well screened gravel or sand in the proportion of two parts of sand to one part of cement, thoroughly incorporated together and free from lumps.

Stone Sills and Steps.

Steps, window, and door sills will all be of North River Blue Stone, hammer dressed, with ends knocked off square. All door sills are to be of sufficient width to extend the whole thickness of the wall. All sills are to project beyond the wall veil $1\frac{1}{4}$ inches, and each end is to extend into the brickwork 2 inches beyond the reveals. All sills will be cut with washes, and be set level. The sill will be set by putting mortar under each end for several inches, and the brickwork will then be continued. The space under the center of the sill will be pointed up after the brickwork has been completed.

Window Frames and Sash.

All windows are to have glazed sash, each sash containing nine lights. All sash are to be $1\frac{1}{8}$ inches thick, double hung with cast iron weights and American sash cord. Each window is to be provided with one plain japanned safety window sash lock. All window frames are to be made of good quality material, full boxed for weights, and provided with pulleys not less than $1\frac{3}{4}$ inches in diameter.

Doors.

All large doors are to be in two parts as shown in plans, and to roll on wrought-iron track. Each door will be provided with tracks, rollers, lock, escutcheon, key, and bolts complete, no bolts being less than $\frac{1}{2}$ inch in diameter. These doors will be constructed of good quality, mill-dressed, tongued, grooved, and beaded $\frac{7}{8}$ inch ceiling material, carefully put together. Battens for these doors shall not be less than 6 inches wide.

Entrance door to office shall be $1\frac{7}{8}$ inches thick, with tongue and grooved panels, hung with 3 by 4 inches plain japanned butts, with lock, mineral knobs, escutcheon and key complete. Door between office and engine room shall be $1\frac{3}{4}$ inches thick, six panels, hung with $3\frac{1}{2}$ by $3\frac{1}{2}$ plain butts, with lock, key, mineral knobs, etc., complete.

Painting and Glazing.

Sash, frames, doors, and all finished wood work shall receive three coats of paint composed of linseed oil, white lead, and colors of best quality. Tints and colors to be selected by the city. After the priming, all wood work is to be carefully puttied up with good quality of putty. All sash are to be glazed with American glass of good quality, free from wind cracks or large bubbles, strongly secured by beads and neatly back puttied.

All iron work in the roof will receive two coats of best quality metallic roofing paint.

Roof.

The roof will be constructed of iron, the trusses being designed on Fink's plans. All rods, bolts, etc., used in the construction of the trusses will be guaranteed to be of a tensile strength of 50,000 pounds per square inch of sectional area, and the roof will be warranted to be capable of sustaining a load of 40 pounds per square foot of area.

Slate.

The roof shall be covered with good quality merchantable slate, 12 inches wide and 24 inches long, laid with 3-inch flap, firmly secured to the purlines with copper wire, and warranted to be weather proof. Care will be taken to lay the slate in straight lines.

Crown Moulds and Leads.

Crown moulds will be of galvanized iron, firmly secured. All leads will be of corrugated galvanized iron, 5 inches in di-

ameter, firmly secured to the walls with holdfasts driven into the bricks.

Floors.

The floor of the boiler room snall be made of good quality brick set close together. The floor in the remainder of the building shall be asphaltum, laid level and smooth.

SPECIFICATION FOR ENGINES.

Two Engines.

Each engine will be 75 horse power, the cylinder 16 inches in diameter, 24-inch stroke, the frame of the girder type is heavy and rigid. The cross head will be fitted with steel wrist pin, and phosphor-bronze adjustable slippers; the wrist pin will be lubricated by a curve branch secured to its center and mounted with sight feed cup.

The connecting rods are made of the best quality of hammered iron, also straps, gibs, and keys; the boxes are heavy and made of phosphor-bronze, with large surfaces working on steel pins.

The shaft is made of best hammered iron, turned true all over, fitted with counter-balanced disc crank.

The fly wheel is 10 feet in diameter, weighing about 10,000 pounds.

Each engine will be furnished with sight feed lubricators for lubricating the cylinders, and the latest improved oil cups for lubricating the working parts, also with drip cocks for the cylinders and pipes. The exhaust from the engine will be conducted to a feed water heater and purifier, that the feed water may be heated and purified before entering the boilers.

Each engine will be connected directly to a Baker blower and bolted upon a foundation, built in stone and brick with cement.

Two Baker blowers will be erected on substantial founda-

tions, built in cement. Each blower to be a No. 7½, having a capacity of 72 cubic feet per revolution. These blowers are manufactured by Wilbraham Brothers, of Philadelphia, and are the best in the market.

SPECIFICATION OF BOILERS.

Three Boilers—450 Horse Power.

Each boiler will be 72 inches in diameter. Thickness of shell, $\frac{7}{16}$ inch. Thickness of heads, ½ inch. Length of tubes, 18 feet. Number of tubes in each boiler, 60. Diameter of tubes, 4½ inches. Each boiler will be connected to one steam drum 32 inches in diameter and 20 feet long, with a stop valve between the steam drum and each boiler.

Each boiler will be furnished with two 6-inch safety valves; one steam gauge; one water column; and three weighted gauge cocks.

Each boiler will be enclosed with brickwork forming combination chambers and supports.

Each boiler will have a substantial front, which will be made of cast and wrought iron, extending across the entire front. The upper part of the front will have two large doors arranged for access to the tubes; two fire doors, and two ash pit doors.

Each boiler will be provided with a set of grate bars, 6 feet long by 6½ feet wide, with necessary bearings to support same, adapted for burning coal. Also dead plane for each fire door, necessary bridge walls, wall binders and bolts, cleaning doors, frames, and such other castings as may be necessary to properly set the boiler.

All material to be new, and the best quality of their respective kinds. The work to be done in a thorough manner by skilled mechanics.

The boilers will be provided with one No. 6 steam pump, to supply the feed water, and one injector to each boiler.

The boilers will be tested and made tight under a hydro-

static pressure of 150 pounds per square inch. After the boilers are erected they shall be thoroughly tested, and pass the City inspection for a continuous pressure of 100 pounds per square inch.

SPECIFICATION FOR CONDENSING HOUSE.

General Items.

The plans are all drawn to scale, but in any case in which there is a difference between the figures and the scale, the figure dimensions are to be followed. The drawings are designed to show the plans and elevation of the building, and the arrangement of the apparatus to be contained therein.

Dimensions.

The inside dimensions of the building are as follows: Length, 76 feet; width, 40 feet; height to top of wall plate, 20 feet. For other dimensions needed, either for comparison or for the actual construction of the building, see working plans.

Excavations.

The trenches for the foundations to be carried to a depth of four feet below the grade, and are to be two feet wide. The excavations for the foundations for scrubbers and condensers to be nine feet square and four feet deep. After the masonry is completed and set sufficiently, the remainder of the trench must be filled in carefully with dirt to prevent any water from damaging the foundation walls.

Foundation Walls and Piles.

The foundation walls shall be 20 inches thick, and be carried 4 feet below the grade line, and to be composed of best quality native stone and cement mortar in the proportion of two parts sand to one part cement. The foundation walls to be supported on two rows of piles. The piles are to be 12 inches diameter, 30 feet long, when necessary, and 3 feet

between centres, driven solidly home. Each row of piles to have hemlock cap, 8 x 12 inches, firmly secured to piles by iron bolts not less than ¾ of an inch in diameter. The stone to rest on these caps, each stone in the first course being of sufficient size to extend through the whole thickness of the wall. The face of the wall, below the grade, will be dashed, and the joints in the remainder will be neatly pointed up. The foundation for the scrubbers and condensers shall rest upon a base of sixteen piles, 12 inches in diameter, and spaced 3 feet between centres with hemlock caps, 8 x 12 inches; on these caps a floor of hemlock, 4 inches thick, shall be built to receive the masonry foundation for the apparatus. This foundation shall be constructed as follows: On the hemlock floor a shell of 9 feet square, outside dimensions, shall be built of brick, the wall being 13 inches thick. This shell shall be filled with concrete, composed of sand, cement, and broken stone or brick, sufficiently small to allow each piece to pass through a 2½-inch ring. This concrete shall be rammed in hard and firm, and carried up to within 5 inches of the top of the brick walls. The last two courses of brick shall extend over the surface of the concrete, making an even brick floor for the reception of the apparatus.

Brick Work.

All the walls above the foundation shall be built of brick, and be of various thicknesses as shown in the plan of the building. The thickness of the wall veil shall be 13 inches, with 4½ inches pilaster, as shown in the plan. The window caps are to project 4½ inches beyond the wall veil. The cornice will project as shown in the elevation and sectional plan. All the brick work shall be done with good quality hard burned brick. The brick are to be laid carefully, with close joints, which are to be struck and smoothed down with the trowel. All brick shall be of uniform color; all joints will be kept straight and level; the work shall be firmly tied by making every seventh course of headers, and care will be taken to put

sufficient mortar in the vertical joints between the headers to prevent any water driving through the wall during wet weather. All tie rods, anchors, etc., which are necessary will be furnished and carefully set.

Mortar.

The mortar for the stone foundations is to be composed of sharp sand, or well-screened gravel and cement in proportion of two parts of sand to one part of cement. It will be carefully mixed so as to be of uniform quality throughout. The mortar for the brick work shall be composed of best sharp screened or river sand, and best fresh burnt lime, in the proportion of two barrels of sand to one barrel of lime. This mortar shall be carefully mixed, so that it will be free from lumps and homogeneous throughout.

Window Frames and Sash.

All windows, except the two gable end windows, used for ventilators, are to have glazed sash, each window having eighteen lights. All sash are to be of well-seasoned selected white pine, and $1\frac{1}{8}$ inch thick, double hung, with cast-iron weights and American sash cord, and glazed with American glass. Each window to be provided with a safety latch of improved pattern. The window frames to be boxed for weights, and to be of white pine with yellow pine sills. All the frames to be set as shown in the plan. The ventilating windows to be situated as shown, and to be provided with slats 5 inches wide and 4 inches apart, and set pivoted so that they can be closed.

Doors.

The openings for doors, as shown on plan, are to be closed by double doors sliding on rollers, guided by iron track. The door will part in the centre and each half move in the opposite direction. The rollers will be of sufficiently large diameter to enable the doors to be shifted easily. The doors to be made of $\frac{7}{8}$-inch tongued and grooved material, mill-worked, and beaded as shown in the drawings. Battens for these doors to

be 2 x 6 inches, placed 2 feet 6 inches apart, making four for each door.

Hardware.

One safety-window lock will be provided for every window containing sash. Track for sliding doors will be of good commercial wrought-iron, and of an approved pattern, firmly secured. Each door to have one lock of good make, with escutcheon, handles, etc., complete. Each half of the door to have its own separate bolt.

Glass.

All the glass used in the building is to be of American manufacture, of good quality, free from cracks, warps, large bubbles, and other serious defects.

Stone Sills.

All window sills to be of North river blue stone, hammer-dressed, with ends knocked off to straight line. The sills are to project beyond the wall veil, the amount of this projection to be found on the plans. All the sills to be set with a wash between jams, as shown. Each sill will extend two inches into the brick-work beyond the reveals on each side. When setting the sills, care will be taken to get them level. The mortar will first be placed under a few inches of the sill at each end, and the frames will be set, and the brick-work built up around them. The space under the middle of the sill will be pointed up after the brick-work of the building has been completed, thus avoiding any danger of breaking the sill in the centre.

Painting.

Sash, window frames, doors, etc., shall all receive three coats of paint, composed of linseed oil, white lead, and colors of best quality. All tints and colors are to be chosen by the city, or, if not so chosen, the builders will select such tints and colors as they may think most appropriate. After the first coat or priming, all nailholes, cracks, scratches, etc., are

to be puttied up carefully with putty composed of raw linseed oil and whiting. The roof is to receive two coats of the best approved brand of metallic roofing paint.

Floor.

The floor of the building will be carried on 2 x 4 inch sleepers, laid 20 inches between centres. The flooring will be of yellow pine, mill-dressed, 5 inches wide, $\frac{7}{8}$-inch thick, tongued, grooved, and driven close together, and firmly nailed.

Roof.

The roof shall be constructed of iron. Trusses shall be built on Fink's plan, giving a roof which will be guaranteed to be able to carry a load of forty pounds to the square foot area. All iron used for trusses, tie-rods, etc., to be of a tensile strength of 50,000 pounds per square inch, of sectional area.

Slate.

The roof will be covered with good quality merchantable slate, 24 x 12 inches, laid with three-inch lap, and secured firmly to the purlines with copper wire, and guaranteed weather proof.

Crown Mould.

Crown mould to be of galvanized iron of the depth shown on plans.

Gutters and Spouts.

All down spouts or leads are to be of corrugated galvanized iron, 5 inches diameter. Gutters are to be of galvanized iron firmly nailed and soldered.

This building will contain six condensers, each 8 feet 6 inches in diameter, 18 feet high, with a cast-iron base 3 feet high, of ornamental design; the metal of which is to be $1\frac{1}{2}$ inches in thickness. The shell of the condenser to be made of $\frac{3}{8}$-inch boiler-plate, the heads to be made of $\frac{3}{4}$-inch flange-steel, and the top cover of $\frac{3}{4}$-inch-tank-steel. The said cover

to be joined to the cylindrical bar by means of $3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{5}{8}$-inch angle-iron, and $\frac{5}{8}$-inch rivets, 3-inch centres.

The tubes of this condenser are to be 159 in number, 4 inches diameter, placed at 7-inch centres, and 13 feet long.

A man-hole is to be provided in the top, and, also, in the bottom casting. 20-inch in-and-outlet pipes are also to be provided.

A 3-inch overflow or tar connection to be placed near the pipes. An ornamental cornice to be put around the top.

Condenser.

The condenser is to be 8 feet 6 inches in diameter, 18 feet high, with a cast-iron base 3 feet high, of ornamental design; the metal of which is to be $1\frac{1}{2}$ inches in thicknes. The shell of the condenser is to be made of $\frac{3}{8}$-inch boiler-plate. The head to be made of $\frac{3}{4}$-inch flange-steel, and the top cover of $\frac{3}{4}$-inch tank-steel. The said cover to be joined to the cylindrical bar by means of $3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{5}{8}$-inch angle-iron, and $\frac{5}{8}$-inch rivets, 3-inch centres.

The tubes of this condenser are to be 159 in number, 4 inches diameter, placed at 7-inch centres, and 13 feet long.

A man-hole is to be provided in the top, and, also, in the bottom casting. 20-inch in-and-outlet pipes are also to be provided.

A 3-inch overflow or tar connection to be placed near the pipes. An ornamental cornice to be put around the top.

Scrubber.

The scrubber is to be the same in general outward appearance as the condenser before described, with the exception, instead of having tubes, the scrubber shall be provided with angle-iron rings 3 x 5 x $\frac{1}{2}$-inch, placed not more than 3 feet apart. On said rings, wooden trays are to be placed to support the scrap tin, wood, or whatever may be used for washing the gas.

The whole of the work is to be done in the best workman-

like manner; to receive one coat of paint before leaving the shops, and after erection, one coat; and nothing but the best material for the purpose to be used.

SPECIFICATION FOR PURIFYING HOUSE.

General Items.

All materials herein specified for the erection and completion of the purifying house shall be of good quality, and all work shall be done in a good workmanlike manner. The plans are drawn to scale, but if any difference be found at any time to exist between the figures and the scale, the figures shall be followed in the construction of the building.

Dimensions.

The interior dimensions of the building will be—length, 176 feet; width, 66 feet; heighth, from floor to top of wall plate, 20 feet.

Excavations.

The trenches for foundation walls shall be carried at least 9 feet below grade line.

Foundation Walls and Piles.

The foundation walls shall be 22 inches thick, and be built of best quality of native stone and cement mortar in proportion to one part cement to two parts sand. The surface of foundation walls below the ground shall be well dashed; the portion above ground will be neatly pointed up. Foundations for posts under boxes shall be of brick, 22 inches square, with stone cap 4 inches thick. Foundation for center seal shall be of stone, or concrete and brick, with coping of blue stone 4 inches thick.

Brickwork.

All the walls above foundation shall be built of good quality hard burned brick, laid with close joints, which shall be struck

and smoothed down with the trowel. The wall veil shall be 18 inches thick, with the addition of 4½ inch pilasters. Window hoods will project 4½ inches beyond the wall veil. The walls shall be firmly bonded by making every seventh course of brick a row of headers, care being taken to put sufficient mortar between the headers to prevent any water driving through the wall during wet weather. Brick arches will be laid with as little mortar between the bricks as possible. All anchors, tie rods, etc., which may be necessary, will be furnished and carefully set.

Mortar.

Mortar for stone foundations shall be composed of river sand or well screened gravel and cement, in the proportion of one barrel of cement to two barrels of sand, thoroughly mixed together. The mortar for the brickwork shall be composed of good sharp sand or screened gravel and well burnt lime, in the proportion of one part by measure of lime to two parts by measure of sand, thoroughly incorporated and worked until the mortar is of uniform quality throughout.

Window Frames and Sash.

All windows are to have glazed sash, four lights each. Sash will all be made with well-seasoned white pine, one and three-quarter inches thick, and be double hung with iron weights and American sash cord. Window frames shall be made of good quality white pine, with yellow pine sills, and be full boxed for weights.

Doors.

All doors shall be double, and each half is to have its own separate track, rollers, etc. The doors shall be made of seven-eighth inch tongued, grooved, and beaded M. D. ceiling material; stiles, rails, etc., shall not be less than six inches wide.

Hardware.

Each window shall have one safety window sash lock of approved pattern. Doors shall have cast-iron rollers not less than 4½ inches in diameter, with wronght-iron tracks firmly secured; also, one sliding door lock, with escutcheon, key, etc., complete. Each half of the door shall have wrought-iron bolt, not less than five-eighth inches in diameter.

Stone Sills.

All window sills are to be of North River blue stone, hammer dressed, with wash cut one-half inch deep between reveals, and ends knocked off square. All window sills shall extend two inches past the reveals into the brickwork.

Painting and Glazing.

All sash, doors, window frames, and other finished woodwork shall receive three coats of paint, composed of linseed oil and white lead. All tints and colors shall be selected by the city. After the priming all nail holes, cracks, etc., shall be puttied up carefully with putty of good quality. All glass used in the building shall be of American manufacture, free from wind cracks, large bubbles, or other serious defects.

Roof.

The framing of the roof shall be constructed entirely of iron, the trusses being constructed on Fink's system. All wrought iron bolts, rods, etc., used in the construction of the trusses will be warranted to be of a tensile strength of not less than 50,000 pounds per square inch of sectional area. The roof will be guaranteed to be capable of sustaining a load of forty pounds per square foot.

Slate.

The roof shall be covered with good quality, merchantable slate 24 x 12 inches, laid with three inch lap, and secured to purlines with copper wire.

Crown Moulds and Leads.

Crown moulds shall be of galvanized iron, firmly secured. All leads shall be of corrugated galvanized iron, five inches in diameter, securely fastened to the brick walls by holdfasts and iron straps.

SPECIFICATIONS FOR A SET OF CAST-IRON purifying boxes dry centre valve, and twenty-inch connections, floor plates, supporting beams and columns, wrought-iron covers, etc., and two hydraulic carriages.

The purifiers are to be eight (8) in number, each 24 by 36 feet square, by 3 feet deep, all inside measurements. The bottom of each box shall be made in plates, as shown on the drawing, which is made a part of this specification; the plates to be flanged all around and turned downward; the flanges all to be planed square and true to make gas-tight joints when joined together; the joints to be made of a putty composed of red and white lead, mixed with boiled linseed oil.

In the bottom of each box, as shown on the drawing, there shall be cast two (2) 20-inch openings for the two (2) 20-inch connecting pipes. The sides of the boxes shall be cast in pieces, as shown on the drawing, the outside piece forming a cup or hydraulic seal, being cast thereon; the whole of the plates to be properly flanged, planed, and joined together, the same as the bottom pieces; the corner pieces to be cast square in one piece, as shown.

On two opposite sides there shall be placed vertical cast-iron strips, with lugs cast thereon, to receive the ends of the wrought-iron bars that support the lime trays; the wrought-iron bars to be bolted to the lugs by three-eighths ($\frac{3}{8}$) flush head screw bolts; the top of the bar to be countersunk.

The side and end plates, which form the sides and hydraulic seal, shall be made so as to give a seal 24 inches deep by $3\frac{1}{2}$ inches wide; the top edge of the outside plates of said seal or

cups to be 3½ inches wide above the top of the inside plates. All the plates forming the purifying boxes and seals to be five-eighths (⅝) of an inch in thickness. Over the outlet opening of each purifier must be placed a 20-inch pipe, extending as high as the sides of the purifiers, with lugs cast thereon at the proper places to receive the ends of the bars that support the lime trays. The plates to be bolted together with five-eighths (⅝) screw bolts six (6) inches apart, except the hydraulic seal flanges, which shall be bolted together with one-half (½) inch bolts. Each box shall be furnished with the proper number of wrought-iron bars, 2½ inches by ½ inch T iron, to be straight and true, the ends to be drilled and countersunk for the three-eighths (⅜) bolts that secure them to the sides and outlet pipes.

Covers.

Each box is to have a wrought-iron lid of such size that the edges will set directly in the centre of the hydraulic seal when in place. The depth of the sides to be 26 inches. The top sheets to be of No. 10 B. W. G.; the sides of No. 8 B. W. G. The tops and sides are to be joined to wrought-iron frames of angle iron 3 x 3 x ⅜ thick; the bottom edges of the sides to be strengthened with bands of 2 x ¼ flat iron, placed on the outside and secured with ¼ inch rivets driven flush outside, the rivets to be 8 inch centres. All the sheets to be fastened to the angle iron frame with ⅜ rivets, 1⅜ to centres, the same to be driven with drawing tool and button set. The rivets in the cross and end seams shall be $\frac{5}{16}$ flat heads, driven outside with tools as above described, the rivets to be 1-inch centres.

Across the top of each cover, as shown on the drawing, shall be placed six girders, each to be composed of one bar of 6 x ½ inch, and two bars of 2½ x ¼ inch angle iron. The flat bar to be placed between the angle iron bars and riveted thereto with ½ inch rivets 4 inches apart, with drawing tool and button set. These girders are to be secured to the top sheets by their projecting flanges with ⅜ inch rivets, 6 inches apart; the ends of the girders to be secured to the angle iron frames with ⅝ inch

rivets, two in each of the girders. On each cover sixteen latches shall be placed, six on each side, and two on each end, to be made of 2 x $\frac{5}{8}$ inch flat iron, to be spread to flare 3 inches at their lower ends, making an offset of $\frac{1}{2}$ inch on each side to catch on the lugs, which are to be placed on the sides of the hydraulic seal, and to take hold under the cup 2 inches. The latches, cast-iron lugs, pins, etc., are shown on the drawing. On each cover in the places designated on the drawing, one vent opening shall be placed, nickel-plated; one opening 6 inches in diameter with test cock on top.

Centre Seal.

The centre seal is to be of cast-iron, and the kind denominated "dry centre valve," and is to be made in three pieces, as follows: The lower portion shall be 3 feet $7\frac{1}{4}$ inches in diameter, and 3 feet high, the upper end to have a flange projecting outward by which it is to be bolted to the middle section. In the centre of the lower section shall be cast a cylinder 20 inches internal diameter, and $\frac{5}{8}$ inch thick, leaving an annular space between the inside and outside cylinders of $4\frac{1}{2}$ inches, the metal in the outside cylinder being $\frac{5}{8}$ inch thick, the top edge of the inside cylinder to be increased to $1\frac{1}{2}$ inch face. On the lower section shall be cast two sockets for 20 inch pipe, as shown on the drawing. One socket to be on the outside cylinder, and an open communication with the annular space heretofore alluded to; the other socket to extend through and communicate with the inside cylinder or 20 inch pipe. The middle section is to be 5 feet $10\frac{1}{2}$ inches in diameter, and 2 feet $2\frac{1}{4}$ inches high. This section to consist of three cylinders, the two inside ones to correspond in size with those of the lower section already described. The thickness of the metal in this section is to be $\frac{5}{8}$ inch thick, except where otherwise specified.

The inside cylinder is to be held in its position by four vertical ribs cast in, extending across the annular space connecting with the middle cylinder. The upper and lower edges of

inside cylinder being increased in thickness to $1\frac{1}{2}$ inches. On the outside of the cylinder shall be cast eight sockets for 20 inch pipe to connect, being equally divided in its circumference. Between the sockets partitions shall be cast extending from the outside to the middle cylinder; the top edge of said partitions and of the middle cylinder must be increased to $1\frac{1}{2}$ inches in thickness for the valve face.

On the upper edge of the outside cylinder shall be cast a flange one inch in thickness, projecting outward $1\frac{1}{2}$ inches, forming a recess for the top section to rest in and guide it when rotating. The top section must be the same diameter as the middle section, with two internal cylinders corresponding in size with those of the middle cylinder, the height to be 2 feet $3\frac{1}{4}$ inches; the thickness of this section to be $\frac{3}{4}$-inch, except where otherwise specified. On the lower edge, projecting outward $2\frac{1}{4}$ inches, shall be cast a flange $1\frac{1}{2}$ inches in thickness. The annular space formed by the outside and middle cylinders is to be divided into five apartments, to correspond in size with those of the middle section, and three of them to be in size each equal to two of the apartments in the middle section.

The edges of the cylinder and partition plates to be increased to $1\frac{1}{2}$ inches width on the face; where the gas passes over the partition plate of the middle section of the dry valve there shall be cast iron pieces connected with the top section, $1\frac{1}{2}$ inches wide by 2 inches deep, to cover the face of the partition plates, so that no part of the finished surface shall be exposed to the direct action of the gas.

The two small apartments of the top section of the centre valve must be separated by one large one, one on one side and two on the other. (See drawing.)

One of the small apartments shall be made to communicate with the 20-inch cylinder inside, the opening being enclosed across the annular space formed by the inside and middle cylinders; the other small apartment must be made to communicate with the annular space between the inside and middle cylinders by cutting out the middle cylinder between partitions

that forms the apartment, leaving 1½ inches width by 2 inches thickness of the edge to cover the valve face of the middle section.

The top of the upper section to be rounded on the outside as the plan shows.

The valve is to be so arranged as to rotate with the "sun" passing the gas through the clean lime last.

In the centre of the top shall be drilled and tapped a hole to receive a strong eye-bolt, by which it may be raised. (See drawing.)

The parts of each section that join each must be turned off true, and the faces between the top and middle section must be scraped and ground to a perfect tight joint. The bottom and middle sections shall be firmly bolted together, with red lead between the flanges to make a perfect joint. On the top section, near the flange, shall be bolted gearing, 1¼ inches pitch and 2½ inches face, extending around the cylinder with a flange cast on it, by which it is secured to the cylinder. On this gearing a pinion shall work, held by a vertical shaft, the shaft to be supported at its bottom end by a cast iron step, secured to the stationary part of the centre valve, and at the upper end by a bearing projecting from a cross girder placed in the proper position for the purpose. The shaft is to extend to the under side of the cast iron floor, through which a square opening must be made large enough to admit a socket wrench. The top of the shaft to be square, upon which the wrench or key shall fit. On the shaft shall be placed a ratchet wheel and pawl to prevent the valve being rotated the wrong direction.

The centre valve shall also be provided with a latch, consisting of a stand bolted to the stationary part of the centre valve and a two-armed lever, as shown in the plan. The short arm of the lever to have jaw forged on it to receive a steel pin. Through the rib on the top section, where the stand is bolted, must be drilled a hole to receive the steel pin, and on the edge of the flange, on the rotary part of the centre valve, shall be drilled four holes in the proper places to shut off the

four purifying boxes in succession. The long end of the lever must extend to the side (or even therewith) of one of the purifying boxes, with a rod attached to the outside end, passing up through the floor, with a handle and slot on its upper end.

The centre valve must be connected with each box by two 20 inch pipes. (See drawing.)

Around the sides of the purifying boxes there shall be bolted $2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{3}{8}$ angle iron, upon which the cast iron floor plates shall rest. The floor plates are to be of the pattern shown on the drawing; they shall be $\frac{1}{2}$ inch thick, and strengthened by ribs on the underside, the width of the ribs to be proportionate to the span of the opening that the plate is to cover. The plates between the boxes and the walls opposite the boxes will not need ribs. The plates for the entire floor shall be furnished, except, of course, the space occupied by the eight boxes. All the joints in the cast iron boxes and center seals are to be planed or turned true, so as to make gas-tight joints when bolted together, with red lead putty between the flanges or joints that join. On the inside of the side plates of the purifying boxes, on two opposite sides, parallel with the cross bars, ribs shall be cast on, projecting inward one inch, the proper distance apart to receive the ends of the lime trays. The wrought iron covers shall be put together with red lead, painted on the laps where the sheets join. The centre valve shall be drilled in the proper places to receive eight two-inch cocks for drain syphons, the stop cocks for the same to be furnished.

All the materials shall be put in the proper place assigned it. The foundations, etc., to be put in place by us. The entire lot of material to be painted at the shops and after being put up. Everything must be of the best quality, and the city reserves the right to reject, through their engineer, any or all materials which is of inferior quality, and anything condemned shall be replaced immediately at the expense of the contractor, and any incompetent workman shall be discharged at the direction of the engineer.

If anything has been omitted which shall be found necessary to make the whole complete, the same shall be furnished by the contractor without additional cost to the city.

Supports and Flooring.

The purifying boxes are to be supported on a series of 8 inch I beams, weighing not less than 90 pounds to the yard, as shown on drawing; said beams to be in turn supported by nine (9) cast iron columns to each box, running inside, so as to form a general support for purifiers, carriage tracks, and also flooring. The flooring to be made of cast iron plates, diamond shaped, not less than five-eighths of an inch thick, and in convenient sizes.

Hydraulic Lifts.

There are to be two (2) hydraulic carriages provided for raising and removing the purifier covers. Said carriages to be constructed similar to the ones now in use at the Twenty-fifth Ward Gas Works, with the exception of the hoisting gear, which is to be composed of a hydraulic cylinder with pump attached, and cylinder tank. Said cylinder to he placed at the centre of carriage, and four chains, one from each corner, to be connected to a cross bar, which is fastened to piston rod of cylinder through pulleys, thus enabling all four corners of cover to be raised simultaneously.

SPECIFICATION FOR COAL SHED.

General Items.

All material herein specified for the erection and completion of the coal shed shall be of good quality, and all work will be done in a good workmanlike manner. The plans accompanying this specification are drawn to scale, but if any difference be found to exist between the figures and the scale, the figures shall be followed in constructing the building.

General Dimensions.

The building shall be 75 feet long, 40 feet wide, and 26 feet high, inside measurement. Posts shall be 4 by 8 inches. Sills shall be 4 by 8 inches, and rest on stone piers. For additional coal houses, see third page of this specification.

Excavation, Foundation, etc.

Excavation for piers shall extend 3 feet below grade line. The piers to support the building shall be 2 feet square, constructed of stone of good quality, and mortar composed of two parts of well-screened gravel or river sand to one part of Portland cement, of uniform quality throughout. The stone shall be shaped by the hammer, so that it will be solidly bedded. That part of the pier below the ground shall be well dashed while any joints above grade will be neatly pointed up.

Framing.

The frame of the building shall be constructed of good quality hemlock lumber, the dimensions of the several parts being as shown in plans. The frame shall be thoroughly braced whenever necessary to secure strength and rigidity.

Roofing and Sheathing.

Sheathing shall be corrugated galvanized iron firmly secured to the framing by nails and lapped sufficiently to make a water-tight joint. The roof shall be covered with corrugated galvanized iron firmly secured to the purlines and be guaranteed weather proof.

Framing of Roof.

The roof shall be constructed entirely of iron, all trusses being built on Fink's system. All tie-rods, bolts, etc., used in the construction of the roof shall be of tensile strength of not less than 50,000 pounds to the square inch of sectional area, and the roof will be warranted to be capable of sustaining a load of 40 pounds per square foot.

Leads.

All leads shall be of corrugated galvanized iron, 5 inches in diameter, and firmly secured to the walls of the building by holdfasts or other reliable fastenings.

Doors.

Doors are to be constructed of $\frac{7}{8}$-inch good quality mill-dressed tongued, grooved, and beaded ceiling material. Battens and braces shall be not less than 6 inches wide. All doors are to roll on iron track, and be furnished with rollers, bolts, locks, escutcheons, and key complete. Bolts will not be less than $\frac{1}{2}$-inch diameter.

Painting.

All finished wood work will receive three coats of paint composed of linseed oil, white lead, and good quality colors; the tints to be chosen by the city. After the first coat of paint all nail holes in the finished work are to be puttied up. Roof, sheathing, and all other iron work will receive three coats of best quality of approved metallic roofing paint.

SPECIFICATION FOR ADDITIONAL STORAGE HOUSE FOR COAL.

General Items.

The plans accompanying this specification are drawn to scale, but wherever any difference may be found to exist between the scale and the figured dimensions, the figures will be followed when constructing the building. All material herein specified shall be of good quality, and all the work will be done in a good workmanlike manner.

Dimensions.

The building shall be 144 feet long, 25 feet wide, and 24 feet high.

Excavating, Foundations, etc.

The building shall be supported by piers 2 feet square, a pier being placed under each post. Excavations for piers shall be carried three feet below the grade line. The piers shall be built of good quality stone, shaped by the hammer, so that it can be solidly bedded. That part of the face of the pier wall below the ground shall be neatly pointed. Mortar for the piers shall consist of 1 part of cement and 2 parts of river sand or well-screened gravel, mixed until the mortar is of uniform quality throughout.

Frame.

The frame shall be of good quality hemlock lumber, the dimensions of sills, posts, etc., shall be as shown on the working plans. The frame shall be thoroughly braced wherever necessary, in order to make the building rigid and strong.

Sheathing.

The sheathing shall be corrugated galvanized iron. This sheathing shall be firmly secured to the framing by nails, every joint having sufficient lap to render the walls thoroughly waterproof.

Roof.

The roof shall be constructed entirely of iron, the trusses being built on the Fink plan. All bolts and tie-rods used in the construction will be guaranteed to be of a tensile strength of 50,000 pounds to the square inch of sectional area, and the roof will be guaranteed to be capable of carrying a load of 40 pounds to the square foot. The roof shall be covered with corrugated galvanized iron firmly secured to the purlines, and well lapped to make the roof water-tight.

Doors.

Doors are to be constructed of $\frac{7}{8}$-inch good quality milldressed, tongued, grooved, and beaded ceiling material, battens and braces being not less than 6 inches wide. All doors are

to slide on iron tracks, and be furnished with rollers, bolts, locks, escutcheons, and key complete. Bolts will not be less than ½-inch in diameter.

Painting.

All finished wood work will receive three coats of paint composed of linseed oil, white lead, and best quality colors, the tints to be chosen by the city. After the first coat of paint all nail holes in the finished work are to be carefully puttied up. All iron work, sheathing, and roof will receive three coats of best quality of approved metallic roofing paint.

Leaders.

Leaders shall be of corrugated galvanized iron, 5 inches in diameter, and firmly secured to the walls of the building by holdfasts or other reliable fastenings.

SPECIFICATIONS FOR LIME HOUSE.

General Items.

All material herein specified for the erection and completion of the Lime House shall be of good quality, and all work will be done in a good workmanlike manner. All rubbish caused by the erection of the building shall be removed from the premises by the builder.

Excavation.

Wells for the piers shall be carried to a depth of (3) feet below grade line.

Dimensions.

The dimensions of the building, inside measurement, shall be—length, 50 feet; width, 35 feet; height, from floor line to top of plate, 20 feet.

Stone Piers.

The buildings shall be supported by piers placed one under each post, with a separate row running under the longitudinal line of the floor. The piers shall be built of stone and cement mortar, composed of river sand or well-screened gravel and cement, in proportion of one part, by measure, of cement to two parts, by measure, of sand well mixed together.

Framing.

The frame of the building shall be made of good quality hemlock lumber, and be firmly secured and well braced wherever necessary, in order to obtain rigidity and strength. Dimensions of the various parts of the roof may be ascertained from working plans.

Floor.

The floor shall be of yellow pine, 1½ inch thick, laid with close joint and firmly nailed to the joists.

Roof.

The framing of the roof shall be of heavy hemlock lumber, firmly braced and secured, as shown in the working plans. The roof will be covered with corrugated galvanized iron, securely nailed to the purlines and lapped sufficiently to make it thoroughly water-proof.

Leads.

All leads will be made of corrugated galvanized iron, firmly secured to the walls by galvanized iron straps.

Window Frames and Sash.

There shall be two windows 4 feet by 6 feet on each side and end of the building, each window having one nine-light sash. The sash will be hinged at top, swinging inward, and be provided with pulley and cord complete. Frames shall be made of good white pine, with yellow pine sills.

Doors.

Each door shall be double, and made of $\frac{7}{8}$ inch tongued, grooved and beaded mill-dressed ceiling material, as shown in plans. The two sections of the door shall slide on wrought-iron track.

Hardware.

The door shall be provided with good quality wrought-iron tracks and cast-iron rollers, the latter being not less than $4\frac{1}{2}$ inches in diameter, and one sliding door lock of approved pattern, with escutcheon, key, etc., complete. Both sections of the door shall have wrought-iron bolts not less than $\frac{5}{8}$ inch in diameter. The sash shall be hung with plain 2 x 3 hinges, and be provided with pulley and cord for raising and lowering it.

Painting and Glazing.

Sash, window frames and doors shall receive three (3) coats of paint composed of linseed oil, white lead and best colors. All nail holes shall be puttied up after the first coat of paint has been applied.

All iron, including roof, will receive two (2) coats of best approved brand of metallic roofing paint.

All glass used in the building shall be of American manufacture, free from cracks, wind, large bubbles, or other serious defects.

SPECIFICATIONS FOR OIL STORAGE TANKS.

Oil Storage Tanks.

We will furnish two storage tanks 40 feet diameter and 20 feet high, each placed on ground where shown. Each tank to be made of $\frac{3}{16}$ flange iron, the top to have 4-inch water space. The top to be well braced and supported by timbers on inside, the sides to have 8 angle iron legs, well bolted to sides. Each tank to have inlet and outlet with vacuum and

pressure valves, all to make a complete job; these tanks to be tested before oil is put into them. These tanks to set upon plank floors laid upon 8 by 8 timbers of yellow pine. There will also be provided 2 daily supply tanks, 9 by 4 by 5, placed outside of generating house, as shown by plans, of ample capacity, all connected to pumps, gauges, etc., complete in all their details.

Trestle Work.

We will furnish and erect the trestle work in accordance to instructions and plans prepared by Railroad Company.

SPECIFICATIONS FOR PUMP HOUSE.

General Items.

All material herein specified for the construction of pump house shall be of good quality; and all work shall be done in a good and workmanlike manner. The drawings are made to scale; but if any difference be found between the scale and the figures, the figures shall be followed in the construction of the building.

Dimensions.

The building shall be 9 feet 9 inches square, inside measment, and ten feet from floor to top of wall plate.

Excavations.

The foundation walls shall be 16 inches thick, and be built of stone and cement. The face of the wall below the ground shall be well dashed, and any joints that may appear above the ground shall be neatly pointed up.

Mortar.

The mortar for stone foundations shall be composed of cement and well-screened gravel, or river sand, in the proportion of two parts sand to one part cement, thoroughly mixed together. The mortar for brick-work shall be made of sharp

sand and freshly burnt lime in proportion of one barrel of lime to two barrels of sand, thoroughly mixed until the mortar is of uniform quality throughout.

Brick-work.

All the brick-work in the building will be done with good quality hard-burned brick, laid with close joints, which shall be struck and smoothed down with the trowel. The wall-veil shall be 9 inches thick, with pilasters 4½ inches thick and 18 inches wide, at each corner of the building. The walls shall be firmly bonded by making every seventh course of brick a row of headers. Care will be taken to have sufficient mortar placed between these headers to prevent any water from driving through the wall in wet weather.

Stone Sills.

Window-sills and door-sills will be of North River blue stone, hammer dressed, with corners knocked off square. Both window-sills are to be cut with ½-inch wash between reveals.

Leads.

All leads to be of corrugated galvanized iron 5 inches diameter, firmly secured to wall by holdfasts and galvanized iron straps.

Pumps.

Two 4½ by 3¾ by 4-inch duplex steam-pumps will be erected and fitted with composition valves for the purpose of pumping the oil from the storage tank to the daily supply tanks, either of which is of ample capacity to supply the full amount required.

Two 6 by 4 by 6-inch duplex steam-pumps will be erected for the purpose of supplying water to the works, either of which is of ample capacity to supply the works. They will also be fitted with hose connections to be used as fire-pumps in case they might be needed for that purpose.

SPECIFICATION FOR TAR WELL.

Tar Well.

There will be placed on the premises as shown a "tar well," 15 feet diameter, 12 feet deep, with partition wall, all laid with hard, well burnt bricks in cement mortar, and plastered on inside with Portland cement mortar, to have inlets and outlets. All drains and wastes to be taken by drain pipes to the "tar well;" the water from the "tar well" to be conducted to the most convenient point for distribution.

SCHEDULE D.

DEPARTMENT OF PUBLIC WORKS,
Office: S. W. Corner Fifth and Chestnut Streets.

BUREAU, GAS.
Subject, Contract for Increased Supply.

Philadelphia, July 17, 1888.

CHARLES F. WARWICK, ESQ.,
City Solicitor.

DEAR SIR:—In addition to the papers sent you on June 30, relative to the contract with the Philadelphia Gas Improvement Co. for an increased supply of gas, I have the honor to enclose a letter from said company dated July 14, which has been accepted by his Honor, the Mayor, and you are requested to make it a part of the contract in place of the letter of the same company dated June 29.

Yours, truly,
LOUIS WAGNER,
Director.

SCHEDULE E.

47 & 49 NORTH SECOND STREET.

Philadelphia, July 14, 1888.

HON. EDWIN H. FITLER, MAYOR,
City of Philadelphia, Pa.

DEAR SIR:—I understood that it had been suggested by Mr. Windrim to substitute for the capping of the piles at the

foundations for the purposed Twenty-fifth Ward Gas Works, a bed of concrete. I have had this matter looked into very carefully and think that you will agree with me that if we cut the piles off below water mark and cap them with 8″x12″ stringers, and on top of this lay a double-deck (crossed) of 4″ decking, making a platform on top of the caps 8″ in thickness, the whole of it to be *below high water mark*, and to extend under the entire area of each building, the foundations will be better than the proposed suggestion.

I have submitted the plans of this form of foundation to Mr. Windrim, who approves of it and thinks that it will make a very excellent job. I have asked for proposals for the work and hope to be able to let it on next Tuesday. I hope that this form of foundation will meet your approval.

I am obliged to go out of the city to-day and will not return until Thursday of next week, and would like to have the work awarded at the earliest possible date before my return to the city. Mr. Windrim states that if the foundations are so arranged as to keep the timber wet, the form which we suggest, is as good, if not better, than the use of concrete between the piles.

If you should desire to see the plans and specifications of the work, they can at any time be shown you by Messrs. Wilson Bros. & Co., who are our engineers and architects in charge of this work.

Very truly yours,

WILLIAM L. ELKINS, Jr.,
President.

The original drawings and specifications of Letters Patent Nos. 311,124; 200,602; 289,282 and 289,277 are not printed herewith, but are attached to the original contract, on file in the office of his Honor the Mayor.

The plans of the buildings proposed to be erected are on file with the Bureau of Gas.

Bureau of Highways.

The operations of this Bureau were simplified during the year by separating from it the work now being done by the Bureau of Street Cleaning. Its official staff was reduced, by a change of highway districts and by the transfer of inspectors to the new Bureau, one assistant to the Chief of the Bureau, one superintendent and five inspectors. Notwithstanding this reduction the streets were cared for as well, or perhaps better than before, because the officers remaining could give undivided attention to specific highway work.

The following comparative summary of the work of the past two years shows a gratifying growth of better-paved streets:

Comparative Recapitulation of New Paving.

	1887.	1888.	
New paving	45,170.13	150,750.13	Linear feet.
Macadamizing (new)	8,669.00	1,466.98	" "
Grading	139,450.00	213,476.71	Cubic yards.
New footway paving		28,166.8	Square yards.
Repairs to paved streets	535,703.13	573,718.64	" "
Footways repaved	3,557.42	7,978.91	" "
Ditches repaved	9,120.	26,234.	
Gutter stone laid	11,860.00	15,295.00	Linear feet.
Crossing stone laid	20,919.78	35,583.00	" "
Tramway stone laid	2,880.56	106.00	" "
Curbstone reset	7,501.00	162,798.00	" "
Wooden trunks	1,981.00	4,337.5	" "
Brick and stone drains	578.5	467.00	" "
Gutters paved	7,809.00	750.00	" "
Hand railings		1,193.00	" "
Broken stone used	8,114.64	11,649.04	Cubic yards.
Macadamizing (resurfaced)		19,083.02	Linear feet.
Footway, curb, and railroad notices served	5,057	9,124	
Block gutters		1,466.98	Linear feet.

Notwithstanding this very great increase, especially in new streets all of which are paved with improved pavement, and in the repaving of old streets with such pavement, the expenditures were materially reduced.

Expenditures in 1887	$1,011,061 94
Expenditures in 1888	895,440 62
Reduction	$115,621 32

The receipts for the same years were as follows:

Receipts for 1887	$56,472 82
Receipts for 1888	58,544 93
Increase	$2,072 11

Eighty-seven bridges of the 181 under the care of this Bureau received repairs of greater or less extent, and those not reached last year will be put in good condition during 1889, to the extent of the money appropriated for this work.

The question of repaving with improved pavement the streets occupied by passenger railway tracks is in the same state of legal uncertainty as a year ago. The case against the Union and the Ridge Avenue Passenger Railway Companies is still undecided, and the "case stated" referred to in my previous report, and of which so much was expected, has never been agreed upon.

The Ridge Avenue Passenger Railway Company was notified to repair certain streets occupied by their tracks, which they declined to do, claiming that they had been relieved of this work by a special Act of Assembly. The repairs were made by this Bureau, and the claim placed in the hands of the Department of Law for collection. After argument on bill and answer, the Court decided the act unconstitutional, and gave judgment against the company. The case is now pending in the Supreme Court on an appeal made.

Notwithstanding this condition of affairs, an important step has been taken toward better paved streets, if not in the direction of a legal settlement of the question of the liability

of the companies for the work, by the appropriation of $200,000 which is to be expended in repaving, with granite blocks, the streets occupied by them. After the notice required by the ordinance governing this matter to the companies to do the work, and their non-compliance with such notice, the work will be let as required by law, paid for out of this appropriation, and the claim placed with the Department of Law for collection. The money recovered, if any, by these suits, can be again appropriated for the continuance of the work of repaving, but if the Courts decide the companies not liable, the streets will have been paved and paid for by the city.

The work proposed will be done upon the streets most in need of repaving, principally in the business part of the city, and distributed along the tracks of all the companies, thereby making the burden of the repayment of the cost less onerous than if the money were all expended on only a few of the lines.

The appropriation for repaving streets not occupied by passenger railway tracks for 1889 is larger than ever before, and with the liberal amounts appropriated for general highway work, very satisfactory progress will be made next year.

The extent of territory to be covered is large and the general condition of our highways bad, but with continued appropriations as large as for 1888 and 1889, or if possible even larger, the area of well paved streets will be extended rapidly, taking much travel from those badly paved, thereby reducing the amount needed for repairs and increasing that for new work.

The custom of repaving a few squares of street here and there as directed by ordinance of Councils, was greatly departed from during the past year, and it is now possible to reach many portions of our city over long stretches of streets paved with granite blocks, sheet asphalt or vitrified brick. With a proper continuance of this mode of work, we shall soon have thoroughfares of streets well paved extending from

south to north, and from east to west throughout our entire city. By pursuing the opposite course, the present unsatisfactory condition of a few squares of granite block, a dozen squares of cobble stone, three or four of vitrified brick, half a mile of rubble stone, and a short piece of sheet asphalt will be continued indefinitely both as to time and extent of territory covered.

Summary of work done in Improved Pavements.

	1887.		1888.	
	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks.....	54,398.08	18,683.00	196,232.23	65,852.61
Asphalt blocks.....	1,587.00	1,054.00	34,464.00	16,629.00
Sheet asphalt.....	.....	.....	16,431.28	5,511.76
Vitrified brick.....	8,041.00	2,881.00	75,601.00	22,542.00
Macadamizing	22,666.00	8,669.00	4,229.96	1,466.98
Total.....	86,692.08	*31,287.00	26,958.47	†112,002.35

Replacing Cobblestone with Improved Pavement.

	1887.		1888.	
	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks.....	29,396.86	10,536.00	65,780.85	24,689.36
Sheet Asphalt.....	33,813.72	10,971.83	44,354.99	13,365.40
Vitrified brick.....	4,000.00	1,044.30	8,274.6	2,160.00
Total.....	67,210.58	*22,552.13	118,410.44	†40,214.76

*1887. Total amount of new paving 53,839.13 linear feet, equal to 10 miles, 1,039.13 linear feet.

†1888. Total amount of new paving 152,217.11 linear feet, equal to 28 miles, 4,377.11 linear feet.

Many of the small streets in the older portions of the city, generally known as "tramway streets," just wide enough for a single wagon track and paved with cobble stones from curb

to curb or with such stones in the centre of the street, and with a row of broad flagstones on either side, are badly out of repair.

They are difficult for wagon travel and detrimental to health because of their condition. Repairs with the same material are practically out of the question, and for the past two years many of them have been repaved with Belgian block with cement joints, and with the gutter in the centre of the street.

This repaving will be continued to the extent of the money available for such work until all these streets have been placed in good condition.

Mr. Joseph McDonald, Chief of this Bureau, having declined a reappointment in anticipation of the expiration of the term for which he had been elected by Councils, Mr. George A. Bullock was appointed from among those having passed the Civil Service examination, to take office on January 1st, 1889.

Board of Highway Supervisors.

The reports of the Secretary and of the Chief Draughtsman of this Board show that for the first time in its history there have been moneys received for work done and in amount in excess of the expenditures. The sum is not large when compared with the sums received and expended by other branches of the city's service, but it is a satisfaction to know that very valuable additions to the records and plans of underground structures are being made without cost to the city.

The Ordinance of Councils fixing the license fee for vaults under the sidewalks has been modified by increasing the amounts from $1 to $5 and from $5 to $25 per foot front, respectively, for vaults extending to within three feet of the curb line, and for those covering the entire width of the sidewalk. This will result in both increased revenue to the city and in decreasing the number and extent of these encroachments upon the public highways.

The following is a summary of the transactions of the Board, the work of the draughtsmen, and of the receipts and expenditures:

Transactions of the Board of Highway Supervisors

Permits authorized to be issued for vaults	8
Permits authorized to be issued for railroad tracks, curves and turnouts	10
Permits authorized to be issued for underground pipes	3
Permits authorized to be issued for electrical conduits	108

Work done by the Draughtsmen of the Board of Highway Supervisors.

Street record plans corrected	38
New street record plans prepared	65
Blue print plans placed on file	110

Receipts and Expenditures.

Receipts for the year 1888	$2,811 00
Expenditures for the year 1888	2,349 89
Profit to the city	$461 11

The applications for permits to open streets continue unabated in number, and the purposes for which structures of all sorts are to be placed underground appear to increase.

With the introduction and repair of water and gas pipes, of sewers and drain pipes, and the necessary house connections, and of conduits for electric lighting made directly by or under the supervision of the city departments, it seems almost impossible to prevent a continued disturbance of street pavements, but when there are added to these the requests from corporations, firms, and individuals for permission to lay railroad tracks, sidings, and turnouts, to place electrical conduits, steam pipes, and steam heating appliances underground, the time when our streets will not be placed out of repair seems to be far in the distant future.

As many of these enterprises are evidence of the extension of business operations, and others for the introduction of new appliances for the comfort and convenience of the people gen-

erally, and as their absence would, perhaps, give us better highways but less of active trade passing over them, it is better as it is, and the city's officials must continue to struggle with the problem of keeping in good condition that which everybody else is working hard to destroy, a discouraging task, but one incident to the government of all rapidly growing and improving communities.

Bureau of Street Cleaning.

This Bureau, established by Ordinance of Councils approved December 6, 1887, assumed charge of this important branch of the public service January 1, 1888. The advantages of its separation from the Bureau of Highways were soon apparent. The five inspectors of the Bureau were enabled to give continued attention to the work expected of them, which they were not able to do when attached to the latter Bureau, liable to be called on at any time to supervise the grading, paving, or repair of highways. The change has produced better work in the removal of ashes, of garbage, and of dead animals, and in cleaner inlets and streets. The disadvantages of badly paved streets have been reduced to a minimum, the whole city presents a cleaner appearance, and the general health of the people has materially improved.

The report of the Chief of the Bureau presents many interesting statistics worthy of careful perusal. The quantity of waste material handled during the year is of startling magnitude, requiring thorough organization and persistent supervision for its removal with the least possible inconvenience or discomfort to the citizens.

The gratifying decrease in the number of complaints of bad service shows that the work was generally well done, and with the disappearance of the friction incident to new plans and new appliances even better service may be expected.

The most notable decrease was in the number of complaints of the non-removal of garbage, especially during the months of June, July, August, and September. In 1887 these numbered

2,074, and 882 in 1888. It is estimated that under our contracts garbage is to be removed from at least 150,000 houses twice a week during four months, four times per week during four months, and six times per week during the remaining four months of the year. This covers more than 31,000,000 possible removals, and whilst it is not probable that this required number has been reached, the fact that during the whole year there were but 1,162 complaints of bad service is pretty fair evidence that there were no serious or extensive neglects.

The matter of an improved pattern of inlet has already had the attention of the Bureau of Surveys, and wherever practicable all new ones will be constructed upon simpler and more effective plans. The inlets already built will be replaced with those of the new style whenever necessary.

For general information a copy of the specifications under which the contracts for the cleaning of the streets of the city, etc., for 1889 have been made, is attached to the report of the Bureau.

The following is a comparative summary of the expenditures for street cleaning for the years 1887 and 1888:

1887	$304,021 00
1888	441,514 50

The total work done during the year just closed is as follows:

Districts.	Cleaned.					Removed.			
	Squares.	Inlets.	Crossings.	Market houses.	Snow from fire plugs.	Number of dead animals.	Number of loads.		
							Dirt.	Ashes.	Garbage.
First	51,295	30,154	5,890	176	315	1,321	46,251	93,805	11,011
Second	57,159	31,862	39,716	622	385	2,811	46,484	79,287	16,277
Third	51,807	31,587	26,255	1,420	261	2,538	41,331	76,422	15,705
Fourth	113,643	69,243	66,028	.....	1,049	9,139	126,587	170,027	29,239
Fifth	46,551	32,286	67,154	.....	588	546	46,069	79,938	16,428
Total	320,455	195,132	205,043	2,218	2,598	16,355	306,722	499,479	88,660

Bureau of Surveys.

The work of this Bureau was largely in excess of its operations in any previous year, the length of sewers built increasing from 22.578 miles, in 1887, to 32.879 miles, in 1888, making the total length of sewers in use in the city 332.350 miles. The ordinances passed and pending for the construction of sewers indicate that the coming year will also show very great increase in this class of work.

The bridges reported as under construction on the line of Ridge avenue across the Wissahickon Creek, and over the River Schuylkill at Market street, have been completed, both of them many months later than the time named in the contracts. The contractor for the former structure has made settlement with the city upon the basis of the damages named in his contract because of his delay, but the contractor for the latter has brought suit to recover the amount withheld. The people generally were greatly inconvenienced and the city put to much expense for the maintenance and care of the temporary bridge because of the many months delay in the completion of the new work.

If this contractor is successful in his suit the Department might as well abandon all efforts to secure the completion of public works, even at the time named in their bids by the contractors themselves, and permit them to finish whenever, at their convenience, they choose to do so.

The crossing over the Trenton branch of the Pennsylvania Railroad at Church street, Twenty-third Ward, has been changed to an under-grade crossing by cutting down the level of this street, and by making other changes made necessary in the adjoining streets. The railroad tracks are carried over the street on a substantial iron bridge.

Similar work is being done on the line of Sixth street, where it crosses the same railroad.

The proposed changes of like character at K street, at Frankford avenue, and at Kensington avenue, were postponed

for want of sufficient appropriation, which it is expected will be made during the coming year.

When this work is done there will remain but one grade crossing of any importance on the line of this road between their station at Broad and Market streets and Church street, Frankford.

A contract has been made, jointly with Delaware County, for the construction of a bridge over Cobbs Creek on the line of Landsdowne avenue and on the boundary line between the two counties.

The bridge on the line of Chester avenue across the West Chester branch of the Pennsylvania Railroad will be extended, under contract executed, so as to make a better approach to the station at Forty-ninth street.

Preliminary plans for bridges over the lines of the Philadelphia & Reading railroad at Girard avenue, and at Second street above Lehigh avenue, have been prepared, and await the action of the Railroad Company as to the amount to be contributed by them for their construction.

The building of a bridge over the River Schuylkill on the line of Walnut street, referred to in my previous report, is an assured fact by the appropriation of $200,000 towards the work. With the approval of Councils work will be begun, and probably completed this year, on the river piers and abutments, and with additional appropriations next year this very important improvement can be completed in 1890 or at the farthest in the following year.

Because of the many railroad tracks both east and west of the river this bridge and its approaches will be 3,590 feet long, beginning east of Twenty-third street, and extending to some distance west of Thirty-second street, crossing the tracks of the Baltimore and Ohio Railroad, several branches of the Pennsylvania Railroad, the West Chester Railroad, and the Philadelphia, Wilmington and Baltimore Railroad. It will necessarily be an iron structure, and will be built sixty feet wide, the full width of Walnut street east of the river.

My previous suggestions as to the expediency of building our sewers, both main and branch, upon some plan to secure the completion of some sewers somewhere, apply this year as well. The system of piece work still goes on in spite of the self-evident fact that the city pays much more for the work than the price for which it could be done if, instead of distributing the money available for this work in driblets all over the city, it were concentrated upon a smaller number of places.

This has been accomplished for the sewers on Tasker street and on Somerset street, where it was not possible to make satisfactory arrangements with the owners of the ground at the outlets of these sewers in 1888, and where the work will be done in 1889 to the extent of the appropriations for both these years, no doubt at very much less cost than if it had been let in two parts, and certainly at very much less inconvenience to the people doing business on the line of these sewers.

Several of our main sewers are in a very dangerous condition and large appropriations must be made at an early day for their repair. The one on the line of the Cohocksink Creek has broken in several places, greatly to the inconvenience of the residents on the streets where the breaks occurred, to the damage of some private property, and the loss of animal life. At least $100,000 will be needed on these sewers, and the more promptly the repairs are made the less costly will the work be.

The bad condition of these sewers arises first and chiefly from bad construction, the present system of inspection of sewers not being in operation when these were built; and second, because most of them are taxed beyond their capacity. This latter difficulty can be remedied only by the building of other main sewers on lines parallel with those already built.

This matter is one of very serious concern, and has already been brought to the attention of Councils by a special message from you, asking an appropriation for the needed repairs.

The main line of the intercepting sewer is finally completed.

Some of the necessary branches for house drainage are finished, others are under construction, and contracts for still others will be awarded shortly. Under the ordinance making an appropriation to the Bureau of Surveys for 1889, a supervisor of this sewer will be appointed, and it is hoped that the many manufacturers and others now discharging filth of all sorts into the river, instead of into this sewer, will comply with the notices served upon them in November last and make proper connection with the sewer. If upon inspection it is found that they fail to do so, the aid of the City Solicitor and of the District Attorney will be asked to secure compliance with law, or upon failure to do so, to enforce the penalties, civil and criminal, fixed for its violation.

The Bureau is engaged in the revision of lines and grades in many of the rural portions of the city, where the numerous building and land operations call for city improvements. It is found that the old rectangular plans of streets are illy adapted to the topography of the land, and very expensive of application, and changes are being made because of these difficulties. Others are made necessary by the change of drainage from above the Fairmount dam to the Schuylkill river below or to the Delaware river, and by the abandonment of the Aramingo canal, and still others because of the many railroad tracks running from or encircling the city, and much time and money must be expended to adapt our plans to this changed condition of affairs. The more rapidly the work is done the less will be the cost of land damages incident to the change of grades after the streets are built upon.

The records of the Registry branch of this bureau are in a dilapidated condition, rapidly wearing out. Arrangements have been made by which they will be copied and the originals filed for future use.

During the year vacancies occurred in the office of Surveyor in the Eighth District by resignation, in the Eleventh District by expiration of term, and in the Thirteenth District by death. The vacancies were filled by the reappointment of

the Surveyor in the Eleventh District, and from among the applicants having passed the examination by the Civil Service Board in the other districts.

These officers receive a salary of $3,000 per annum, provided the fees received and earned in the respective districts, over and above the expenses for office rent, pay of assistants, etc., equal that sum. No money is paid by the city for work done by these officials, but all fees received are paid into the City Treasury.

The total receipts of the four districts working under the new law were	$32,350 99
The total expenses were	21,504 74
Profit to the city	$10,846 25

The appended statement shows the operations of each district in detail.

Summary of Receipts and Expenses of District Surveyors paid fixed Salaries.

District.	Surveyor.	Cash Receipts.	Credit for work done for the City	Total Credit.	Expenses.				Balance Profit to the City.	Remarks.
					Salary.	Pay of Assistants.	Miscellaneous	Total.		
First	Thomas Daly	$8,739 32	$543 83	$9,283 15	$3,000 00	$1,843 00	$918 19	$5,761 19	$3,521 96	1 year.
Eighth	C. A. Sundstrom	1,462 08	433 86	1,895 94	895 96	726 50	273 48	1,895 94		4 months.
Eleventh	Joseph Johnson	5,709 55	1,321 37	7,030 92	2,250 00	1,620 00	1,103 50	4,973 50	2,057 42	9 months.
Thirteenth	H. M. Fuller	12,439 88	1,701 10	14,140 98	2,750 00	3,950 00	2,174 11	8,874 11	5,266 87	11 months.
		$28,350 83	$4,000 16	$32,350 99	$8,895 96	$8,139 50	$4,469 28	$21,504 74	$10,846 25	

The following is a comparative summary of the receipts and expenditures of this Bureau :

	1887.	1888.	
Expenditures	$633,132 16	$569,568 93	$63,563 23 Decrease.
Receipts	22,808 73	26,236 45	3,427 72 Increase.

The operations of the Bureau for 1887 and 1888 were as follows :

Summary of Bridges, Main, Branch, and Private Sewers, built during the years 1887 and 1888.

	1887.		1888.	
	No.	Linear feet.	No.	Linear feet.
Bridges	9		2	
Intercepting sewer (section)	2		1	
Wissahickon Valley sewer (section)	2	17,213.62	16	13,710.28
Storm water conduit, Falls Village	1			
Main sewers	6			
Branch sewers	130	84,709.00	250	149,765.83
Private sewers	63	17,290.00	40	10,124.00
		*119,212.62		†173,600.11

* 1887 equal to 22.578 miles.

† 1888 equal to 32.879 miles.

Bureau of Water.

The work of this Bureau increased more rapidly than the estimated increase of our population. The following is a comparative statement of the operations for the years 1887 and 1888:

	1887.	1888.
Receipts from water rents	$1,721,488 83	$1,793,432 38
" " fractional rents	115,939 21	113,550 16
" " water pipes	106,602 48	133,667 85
" " City Solicitor's office	29,504 04	22,846 97
" " penalties	24,453 03	23,584 86
" " delinquent rents	19,040 87	13,995 04
" " Chief Engineer's office	7,287 61	7,742 45
" " searches	3,412 75	4,158 25
" " delinquent penalties	2,705 79	1,948 54
Total	$2,030,434 61	$2,114,926 50

	1887. Gallons.	1888. Gallons.
Pumped to reservoirs	32,426,779,765	37,078,763,428
Equal to gallons pumped 100 feet high	51,289,948,331	59,497,781,199
Cost per 1,000,000 gallons pumped 100 feet high	3.99 cents.	4.49 cents.

	1887. Gallons.	1888. Gallons.
Pumped by water power	10,105,736,633	11,241,113,108
Pumped by steam power	22,321,043,132	25,837,650,320

	1887. Gallons.	1888. Gallons.
Largest quantity pumped in 24 hours	118,604,079	138,674,777
Smallest quantity pumped in 24 hours	61,232,735	53,636,138

Year.	Average gallons per capita per day, estimating the population at.*	Increase of	Increase per capita per day.	Reduction in cost of pumpage per 1,000,000 gallons.
	Gallons.	Gallons.	Gallons.	
1887	89	3,767,813,196	9	14 cents.
1888	100	4,651,983,663	11	†50 cents.

* 1887—995,000.
1888—1,020,083.

† Increase in cost of pumpage.

The increased cost of pumpage was due principally to the advance in the price of coal which amounted to 47½ cents per ton, an increase of 20 per cent., whilst the increased cost of pumpage was 13 per cent.

The total expenses for the same time were as follows:

	1887.	1888.
Current expenses.....	$731,501 50	$702,776 39
For extensions.....	295,440 09	491,131 01

It is interesting to note the fact that the receipts from current water rents have largely increased, and that the delinquent rents have decreased in like proportion.

The extent of new building operations is indicated by the large increase in collections for water pipe frontage.

Attention is called to the suggestion of the Chief that there has been "a decrease in the receipts from breweries, which pay by meter rate, owing undoubtedly to a falling off in their business," and also to the fact that 3,967 hotel bars and 418 horse troughs were declined. The latter reduction causes suffering to horses which could and should be remedied by the location of watering troughs, either by the city or by the societies organized for the erection of public fountains, or for the protection of animals.

The pumping machinery is in general good condition, but in several of the stations extensive repairs are needed to the boilers, while new boilers are absolutely necessary for the demands made upon the Belmont station.

Additional engines will soon be needed at the Frankford Pumping Station, and at the Spring Garden Pumping Station.

The following detailed statement of the number and type of engine and their several aggregate pumping capacities, at the various stations, will be interesting as well as useful for future reference:

Pumping Station.	Designated Number of Engine or Turbine.	Type of Engine.	Designed Capacity in Million Gallons per day.	Total.
Spring Garden. Old Station	6	Simpson Compound Rotary	10,000,000	
"	7	Marine Compound Rotary	20,000,000	
"	8	Worthington Duplex	10,000,000	
"	11	Gaskill	20,000,000	
New Station	9	Worthington Duplex	15,000,000	
"	10	" "	15,000,000	90,000,000
Belmont	1	Worthington Duplex	5,000,000	
"	2	" "	5,000,000	
"	3	" "	8,000,000	18,000,000
Roxborough	1	Cornish Overhead Beam	2,250,000	
"	2	Worthington Duplex	5,000,000	
"	3	" "	7,500,000	14,750,000
Roxborough Auxiliary	1	Knowles' Pump	500,000	
" "	2	" "		500,000
Mt. Airy	1	Davidson Pump	1,000,000	
"	2	" "	1,000,000	2,000,000
Chestnut Hill	1	Knowles' Pump	250,000	
" "	2	Worthington Duplex	500,000	750,000
Frankford	1	Marine Compound Rotary	10,000,000	
"	2	Corliss Compound Rotary	10,000,000	20,000,000
Kensington		Worthington Duplex	6,000,000	6,000,000
Fairmount. New House	1	Turbine Wheels	2,000,000	
"	3	Turbine Wheels	5,330,000	
"	4	" "	5,330,000	
"	5	" "	5,330,000	
Old House	7	" "	5,100,000	
"	8	" "	5,100,000	
"	9	" "	5,100,000	33,290,000
Total				185,290,000

Early in the year because of a general strike, it was almost impossible to secure anthracite coal, and it became necessary to try other fuel. Both bituminous coal and coke were used, and the results, as detailed in the report of the Chief of the Bureau, are very interesting.

The difference in the results obtained from the different bituminous coals is to be ascribed to their inherent qualities for making steam, and not to any difference in the boilers or in their management. With the reduction in the price of anthracite coal it was deemed better to continue its use, and the contracts for 1889 have been made accordingly.

The most important work of the past year, both as to extent and cost and to the advantage of the water supply for a very large portion of our city, was the completion of the second section of the East Park Reservoir. This basin covers 47.5 acres, it is 31 feet deep, and the top of the bank measures 5,231 feet; when full to the water line, 25 feet, it holds over 306,000,000 of gallons.

Work was commenced on April 2, and water was let into the basin on October 23. The concrete and brick lining was done under contract, and the grading and puddle lining by days work, at a total cost of $405,837.35.

The storage capacity of the city has been increased by the completion of this basin this year, and of the smaller one adjoining finished in 1887, from 195,000,000 to 564,550,000 gallons, and the Department now furnishes an ample supply of clear water to 21¼ square miles of the area of the city, and 78 per cent. of the consumption.

In case of heavy rains pumpage is suspended until the muddy water passes out of the river—a good thing for the pumps of the Bureau, which are injured by the sand and mud contained in the river during freshets, a better thing for the reservoirs, which are filled by the mud which fails to pass into the distributing mains, and still better for the people, who are supplied with water more palatable and more sightly than can be furnished with a limited storage capacity.

The extreme northwestern part of our city is still dependent for its supply of water upon direct pumpage at the Spring Garden Station, no matter what the condition of the river, but the 36-inch main, now being laid between this station and the East Park Reservoir, will be completed shortly, when this pumpage will be taken from the subsided water of that reservoir, and for the first time in many years this large and growing district will be supplied with water fit for use at all times.

The very liberal appropriation for extensions to be made in 1889 will enable the Department to complete the remaining section of this reservoir during that year, thereby adding over 300,000,000 of gallons to our storage capacity.

The following detailed statement of the location, date of completion, elevation, and capacity of the city reservoirs will be useful for reference. It shows that our facilities for improving the water by subsidence have been trebled during the past two years:

	Name of reservoir.	Location.	Date of completion.	Height above city datum.	Capacity in gallons
Lehigh. Fairmount.	Reservoir No. 1	East Fairmount Park	1815	94	26,350,800
	" " 2		1821		
	" " 3		1827		
	" " 4, Section 1		1835		
	" " 4 " 2		1836		
	" " 4 " 3		1836		
	Section 1	Sixth and Lehigh avenue	1852 and 1871	114	26,394,000
	" 2				
	" 3				
Spring Garden		Twenty-sixth and Master streets	1844	120	12,000,000
Corinthian		Corinthian avenue and Poplar street	1852	120	37,341,400
East Park.	Section 1	East Fairmount Park	1887	133	62,737,632
	" 2		1888		306,400,622
	" 3				
Frankford		Oxford turnpike and Conley street	1877	167	36,046,000
Belmont		West Fairmount Park	1870	212	39,758,000
Mount Airy		Allen's lane and Mower street, Germantown	1851	363	4,546,000
Roxborough		Ridge and Shawmont avenues	1866	366	12,838,000
Manatawna tanks—2		Manatawna and Ridge avenues	1878	442	100,000
Chestnut Hill tank		Hartwell avenue and Chestnut Hill R. R, Chestnut Hill	1860	481	40,000
Total					564,552,454

The question of filtration has engaged the attention of the Department, but no plan, equal to the demand of the city, has as yet been submitted at a proposed cost within the limit of the funds appropriated for the operations of the Bureau of Water.

With the urgent and continued demand for *more* water the Department is restricted to the improvement of its quality by subsidence only, and unless the moneys placed at our disposal are very largely increased it is feared that nothing can be done in the important matter of filtration until after other reservoirs have been built for the storage of water to be used in the extreme northwestern part of the city, the West Philadelphia District, and in the northeastern part, and only after several large mains, absolutely needed to connect the various reservoirs, have been laid.

The length of pipe laid was greater than in the previous year, and included a 48-inch main from the Spring Garden basin to the East Park Reservoir.

A 36-inch main from this basin to the Spring Garden station, for purposes of direct pumpage to the northwestern district, was commenced but not completed during the year. A 16-inch main was laid on Dickinson street from Broad street to Moyamensing avenue, and a main of similar capacity on Fairmount avenue from Twentieth to Twenty-second street.

The following is a comparative summary of the total pipe laid and of other work done during the past two years:

	1887.			1888.		
	Feet.	Equal to		Feet.	Equal to	
		Miles.	Feet.		Miles.	Feet.
Pipe laid	122,790	23	1,350	133,552	25	1,552
*Pipe relaid	7,858	.....	.....	19,026	.....	.....

* Adding nothing to feet in ground.

	1887.			1888.		
	New style.	Old style.	Total.	New style.	Old style.	Total.
Fire hydrants placed in position	420	9	429	559	21	580
Substituted for defective hydrants	150	72	222	187	102	289
Fire hydrants in use			6,715			6,929

	1887.	1888.
Water attachments	8,532	8,788

The operations of the construction- and repair-shop continue profitable to the City both in the character of the work done and in the greatly reduced cost at which it is supplied. The amount of work is greater than in any previous year and the saving to the City in cost is estimated at $8000. The sum saved in subsequent repairs is equally great.

The permit clerks and inspectors of this Bureau, whose transfer to the Department of Receiver of Taxes was mentioned in last year's report, have been retransferred to the Bureau by ordinance of Councils to take effect on January 1, 1889, and the disadvantages resulting from their connection with a Department having nothing to do with supplying the City with water, except to collect the water rents, will be removed.

During the year the principal offices of the Bureau were removed from Thirteenth and Spring Garden streets to 1321 Filbert street, a central location, opposite the new City Hall. The rooms now occupied are commodious, well lighted, and convenient of location to all having business with this important branch of the City's service.

The extensions and important repairs contemplated for 1889 are as follows:

Completion of the East Park reservoir.

New boilers at Belmont pumping station.

A 30-inch main from Roxborough to Mt. Airy, and such other of the mains named in the report of the Chief as can be laid with the money appropriated for work of this character.

Many of the suggestions and recommendations made in my previous report have been favorably considered by Councils, and the city is receiving the advantages resulting from their adoption. As the result of the past year's work and consequent experience, the following suggestions are submitted:

Lighting the City:

First.—The organization of this service into an independent Bureau to be called the "Bureau of Lighting."

Second.—A general ordinance regulating the erection of public lamps.

Third.—The consideration of the establishment of electric lighting plants to be owned by the city.

Highways:—Repaving streets with improved pavement throughout their entire length instead of a few squares at a time.

Surveys:—Completing sewers, especially main sewers, instead of building them in sections, as at present.

The appropriations, expenditures, and receipts of the Department by Bureaus are as follows:

Summary of Appropriations, etc., Expenditures, etc., and Receipts of the Department of Public Works, for the year 1888.

Bureau.	Appropr'n for 1888.	Balance available from previous years.	Additional appropriations and transfers.	Total.	Number of warrants drawn.	Amount of warrants drawn.			Transfers from.	Balance available in 1889.	Total.	Amount merging.	Receipts.
						Current expenses.	Extensions.	Total.					
Director's Office...	$13,620 00	.....	$5,907 37	$19,527 37	134	$19,484 83	....	$19,484 83	.....	.....	$19,484 83	$42 54	
City Ice Boats.....	39,500 00	....	.....	39,500 00	156	36,483 19	$2,500 00	38,983 19	.....	.....	38,983 19	516 81	$2,762 65
Lighting the City	270,801 82	....	.....	270,801 82	109	260,865 01	.....	260,865 01	$7,500 00	.....	268,365 01	2,436 81	
Gas.....	3,249,156 79	$75,000 00	250,000 00	3,574,156 79	1,509	3,107,796 24	214,166 50	3,321,962 74	36,607 37	$107,051 57	3,465,621 68	108,535 11	3,875,383 69
Highways.....	821,350 00	167,928 39	192,768 67	1,182,047 06	2,172	357,695 71	537,744 91	895,440 62	900 00	253,313 22	1,149,653 84	32,393 22	58,544 93
Street Cleaning.....	428,000 00	.....	29,514 62	457,514 62	194	441,514 50	.....	441,514 50	.....	.....	441,514 50	16,000 12	
Surveys.....	450,858 00	328,498 77	178,003 58	957,355 35	1,603	160,675 04	408,893 89	569,568 93	15,565 12	353,240 87	938,374 92	18,980 43	26,236 45
Water.....	1,181,588 00	17,142 97	80,000 00	1,228,730 97	5,691	702,776 39	491,131 01	1,193,907 40	637 55	18,562 61	1,213,107 56	15,623 41	2,114,926 50
Total.....	6,404,874 61	$588,565 13	$736,194 24	$7,729,683 98	11,568	$5,087,290 91	$1,654,436 31	$6,741,727 22	$61,210 04	$732,168 27	$7,535,105 53	$194,528 45	$6,077,854 22

The work of the several Bureaus, with tables of the usual statistics, is set forth in full detail in the reports of the respective Chiefs, hereto attached, and for which careful examination and consideration is asked.

These reports show that more work has been done and at materially less cost than in any previous year. The many written and verbal expressions of commendation and my own thorough personal inspection satisfy me that it has been generally well done.

The ice boats have prevented any obstruction in our harbor.

The city has been lighted as well and as economically as is possible under existing conditions.

The quality of the gas has been greatly improved and its cost of manufacture and distribution has been materially reduced. The holders constructed and the large mains laid have aided in securing a better and more uniform pressure in various parts of the city, and the numerous complaints of a year ago have been reduced to a minimum.

The length of streets paved and repaved during the year with improved pavement has been increased from 10 miles in 1887 to over 28 miles in 1888.

The streets have been more thoroughly cleansed, and the ashes, garbage, etc., more satisfactorily removed.

The drainage of the city has been improved and extended by the construction of over 32 miles of sewers, and two important bridges have been completed.

The storage capacity of the water works has been increased from 256 to 564 millions of gallons. Not a complaint of a short supply of water has been received from any part of the city, whilst the water used by 75 per cent. of the consumers has been much improved in quality and more in appearance by the fact that it is not distributed for several days after it is pumped from the rivers.

The general efficiency of the service has been greatly improved, by the knowledge of the officials and employés, that they can retain their places only by strict attention to, and a

faithful discharge of the duties of their several places, and that promotion or appointment can be had only after a test of the competency of the applicants as provided by law.

The results of the Civil Service examinations, through which the Chiefs of two of the Bureaus established their qualifications for the places they now fill, and by which many other positions of importance requiring technical as well as general knowledge and capacity, have been satisfactorily filled, not only justify the wisdom of the enactment of the law, but also show that it has been ably and fairly administered.

The appropriations for 1889 are as follows:

Bureau.	Annual appropriation for the year 1889.	Balance available from previous years.	Total.
Director's Office	$13,820 00		$13,820 00
City Ice Boats	38,300 00		38,300 00
Lighting the City	322,082 94		322,082 94
Gas	2,900,988 00	$107,051 57	3,008,039 57
Highways	1,064,754 00	253,313 22	1,318,067 22
Street Cleaning	411,920 00	*25,042 00	436,962 00
Surveys	774,332 00	353,240 87	1,127,572 87
Water	1,288,064 67	18,562 61	1,306,627 28
Total	$6,814,261 61	$757,210 27	$7,571,471 88

* This is an additional appropriation—not an available balance.

With these increased appropriations, and with the satisfactory equipment of all the branches of the several bureaus, both as to men and means, it is believed that the good work begun in 1887, and continued in 1888, will in 1889 be pushed with vigor to the accomplishment of results still more satisfactory to you as the Executive of the City, and to the people and taxpayers generally.

Very truly yours,

LOUIS WAGNER,

Director.

ANNUAL REPORT

OF THE

BUREAU OF WATER,

DEPARTMENT OF PUBLIC WORKS,

FOR THE YEAR 1888.

OFFICERS

OF THE

BUREAU OF WATER.

Chief Engineer,

JOHN L. OGDEN.

Assistant Engineers,

ALLEN J. FULLER, WILLIAM WHITBY.

Draughtsmen:

John E. Codman, Arthur Marichal, James G. Davis.

Chief Clerk—JOB T. HICKMAN.
Assistant Clerks—J. G. Dixon, Kennedy McNeal.
Correspondence Clerk—P. de Haven.
Search Clerk—Thomas Spence.
Assistant Search Clerk—William H. Shriver.
Assistant Clerk—Willlam J. Duffy.
Time Clerk—William J. Innes.
Pipe Inspector—Theodore S. S. Baker.
Messenger—Haines Lewis.

Telephone Operators:

Mattie Whittingham, Calvin Craner.

General Superintendent,

FRANK L. HAND.

Clerk to General Superintendent—John A. Hayes.
Assistant Clerk to General Superintendent—John B. Wright.

Engineers at Pumping Stations:

FAIRMOUNT—*Engineers*, William H. Cubbler.
John W. Bronson.

SPRING GARDEN—*Engineers*, David Pyke, H. A. Gideon,
Abram Stott, John L. McGinnis.
Telephone Operator—Fannie Shields.

BELMONT—*Engineers*, William Kiner, Thomas Sedden.

ROXBOROUGH—*Engineers*, Joshua Bartley, Archibald Weir.

MOUNT AIRY—*Engineers*, Lewis Culp, William Fletcher.
CHESTNUT HILL—*Engineer*, Henry W. Everly.
FRANKFORD—*Engineer*, Charles Douglass.
KENSINGTON—*Oilers*, Peter J. Tuttle, William Maxwell.

Works—General.

Foreman Carpenter—Henry Guest.
Foreman Bricklayer—Frank A. Mooney.
Foreman Stonemason—Crawford Lukens.
Foreman Rigger—James Forrest.
Foreman Painter—Charles Ravenor.
Foreman Laborer—Matthew J. Richmond.
General Storekeeper—S. C. Buchanan.
Electrician—Henry P. Morgan.
Superintendent of Shop—W. F. Courtney.
Clerk to Superintendent of Shop—W. H. Winter.

Purveyors:

First District, John H. Holmes.
Clerk, William J. Mackey.
General Foreman, James Humes. *Foreman of Repairs*, W. W. Wellington.
Office, 1120 Wharton Street.

Second District, David A. Craig.
Clerk, Charles H. Green.
General Foreman, Michael Young. *Foreman of Repairs*, Edw. Homan.
Office, 918 Cherry Street.

Third District, Charles J. Lowry.
Clerk, J. A. Spanagle.
General Foreman, Elias Abrams. *Foreman of Repairs*, Wm. Magee.
Office, 1420 Frankford Avenue.

Fourth District, John Montgomery.
Clerk, Arthur B. Cook.
General Foremen, George W. Showaker, James H. Forbes.
Foreman of Repairs, James Hutchinson.
Office, Twenty-sixth and Master Streets.

Fifth District, Henry Dawson.
Clerk, F. J. Cornman. *General Foreman*, Charles Frank.
Office, Lyceum Building, Roxborough.

Sixth District, George H. Laut.
Clerk, Jonathan Bonsall. *General Foreman*, Samuel Loeb.
Office, Town Hall, Germantown.

ANNUAL REPORT

OF THE

BUREAU OF WATER,

DEPARTMENT OF PUBLIC WORKS,

For the year 1888.

Philadelphia, January 23, 1889.

GEN. LOUIS WAGNER,
Director of the Department of Public Works.

SIR:—The following report of the Bureau of Water for the year 1888 is respectfully submitted:

RECEIPTS.

The collections from water rents by the Receiver of Taxes and the receipts from the City Solicitor's office have been as follows:

Water rents	$1,793,432 38
Water-pipes	133,667 85
Fractional rents	113,550 16
Penalties, 1888,	23,584 86
City Solicitor's Office	22,846 97
Delinquent rents	13,995 04
Miscellaneous	7,742 45
Searches	4,158 25
Delinquent Penalties	1,948 54
Total	$2,114,926 50

An increase over the preceding year of $84,491.89.

On the following page is given, in tabulated form, the revenue for the past ten years and a comparative statement for 1887 and 1888, showing the increase or decrease in each item or source of revenue. In ten years the annual receipts have

grown from $1,465,625.01 to $2,114,926.50, or over 44 per cent.

The comparison between 1888 and the preceding year shows a large increase in the water rents and in the frontage charges for water pipes laid. The receipts from the latter source are nearly eleven thousand (11,000) dollars greater than in any previous year, and more than four times as much as in 1879. If to the total collected therefor, $133,667.85 be added the unpaid claims amounting to $30,663.13 sent to the Law Department for collection, the revenue derived from the laying of water pipes would be $164,330.98.

There is a marked decrease in the collection of delinquent water rents. The number of properties unpaid on September 1, was 9,896, or about five per cent. On December 31 the number was reduced to 1,535, or less than one per cent.

There are 176,022 properties assessed for water rent. During the year the charges against 321 properties were removed on account of affadavits that no city water was used on the premises. Three thousand, nine hundred and sixty-seven (3,967) hotel bars and 418 horse troughs have been declined. There has also been a decrease in the receipts from breweries, which pay by meter rate, owing undoubtedly to a falling off in their business.

The collections by meter rates amounted to $33,340.16. There are 170 meters in use on establishments as follows:

Mills	28
Morocco Factories	27
Breweries	26
Dye-houses	14
Railroad standpipes	10
Chemical establishments	7
Organ motors	6
Sugar houses	4
Hotels	3
Miscellaneous	45
Total	170

For receipts in detail see report of Mr. E. S. Higbee, Appendix A.

Revenues for Ten Years, 1879 to 1888, inclusive.

YEAR.	Delinquent Water Rents.	Delinquent Penalties.	Water Rents.	Penalties.	Fractional Rent.	Water-Pipe.	Searches.	Chief Engineer's Office.	City Solicitor's Office.	Totals.
1879	$118,234 15	$17,439 36	$1,186,001 69	$22,931 31	$40,516 70	$31,235 92	.....	$2,819 94	$46,445 94	$1,465,625 01
1880	112,728 37	16,783 11	1,218,925 66	19,002 35	48,038 07	26,077 90	.....	4,786 07	38,015 53	1,484,357 06
1881	84,591 40	12,627 66	1,256,662 00	19,234 38	53,451 56	47,489 11	.....	5,549 01	29,936 22	1,509,541 34
1882	78,543 01	11,479 18	1,295,419 87	18,016 23	49,529 90	34,979 52	.....	7,515 88	21,421 05	1,516,904 64
1883	69,995 84	10,310 00	1,380,882 17	23,280 44	67,088 10	45,853 09	.....	8,515 11	21,144 41	1,627,069 16
1884	19,837 72	2,492 97	1,566,027 57	22,797 76	77,557 40	71,542 00	$461 50	10,670 89	21,098 20	1,792,486 01
1885	11,267 25	1,561 03	1,567,031 94	22,298 78	101,643 88	92,182 18	1,988 75	9,197 00	18,993 23	1,826,164 04
1886	15,049 50	1,964 42	1,637,296 69	21,377 89	97,219 62	122,743 91	2,960 00	10,121 36	24,594 95	1,933,328 34
1887	19,040 87	2,705 79	1,721,488 83	24,453 03	115,939 21	106,602 48	3,412 75	7,287 61	29,504 04	2,030,434 61
1888	13,995 04	1,948 54	1,793,432 38	23,584 86	113,550 16	133,667 85	4,158 25	7,742 45	22,846 97	2,114,926 50

Comparative Statement.

1888	$13,995 04	$1,948 54	$1,793,432 38	$23,584 86	$113,550 16	$133,667 85	$4,158 25	$7,742 45	$22,846 97	$2,114,926 50
1887	19,040 87	2,705 79	1,721,488 83	24,453 03	115,939 21	106,602 48	3,412 75	7,287 61	29,504 04	2,030,434 61
Increase	.....	.....	$71,943 55	.....	.....	$27,065 37	$745 50	$454 84	.....	$84,491 89
Decrease	$5,045 83	$757 25	.....	$868 17	$2,389 05	.....	.....	.....	$6,657 07	.....

Appropriations and Expenditures.

The annual appropriation amounted to $1,131,588.00, to which amount was added a special appropriation of $50,000 for water pipes to be laid in front of new houses, and a transfer of $30,000 from the Bureau of Gas, making a total of $1,211,588.00, from which was transferred $137.55 to the Bureau of Highways, and $500.00 to the Department of Public Works; leaving available the sum of $1,210,950.45.

The sum of $17,129.27 was available from the appropriation of the preceding year.

In accordance with a provision of the appropriation ordinance, $14,941.00 were used to pay bills contracted during 1887.

The amount not merging was $4,762.61, due on contract reservations.

The amount merging was $15,623.41, most of which was credited to contracts that did not expire until the end of the year, and for want of time could not be transferred to Items where it could have been used.

The Item for Extensions was utilized for the completion of another section of the East Park reservoir, the laying of a 48-inch pumping main from the Spring Garden station to the East Park reservoir, the laying of a 16-inch supply main in Dickinson street from Broad street to Moyamensing avenue, a new stack at Roxborough, and other work of a minor character.

An estimated sum of money must be set aside for the payment of every contract, said sum to be used for no other purpose except with the contractor's consent until the completion of the contract, when the surplus, if any, may be recredited to the appropriation. For new work an approximate estimate is easily made, but for general supplies it is impossible. No one can foresee what accidents may occur or what quantity of materials may be required for repairs. Should the amount be under-estimated it may be necessary to readvertise or make a supplementary contract, which involve delay. To prevent

this and possible loss to the city, the estimates are made as large as the appropriation will admit, but still the sums set aside for some contracts are insufficient, while others are in excess of our requirements. There should be some arrangement for adjusting these differences without putting the Bureau to unnecessary trouble. In order to meet our liabilities we were obliged to ask for a transfer from another Bureau while over $15,000.00 of our own appropriation was merged at the end of the year.

Appropriations and Expenditures.

Appropriation December 31, 1887.		Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Items.					
1. Salaries:					
Office—Chief Engineer	$73,258 00		$72,107 60		
Fairmount Pumping Station	9,110 00		8,973 64		
Spring Garden Pumping Station	35,485 00		35,277 44		
Belmont Pumping Station	11,050 00		10,965 56		
Roxborough Pumping Station	11,370 00		9,738 12		
Mt. Airy Pumping Station	2,970 00		2,970 00		
Chestnut Hill Pumping Station	1,500 00		1,455 04		
Frankford Pumping Station	5,875 00		5,816 93		
Kensington Pumping Station	5,970 00		5,968 13		
	$156,588 00				
Transferred—					
To Bureau of Highways $137 55					
To Item 7, Bureau of Water 1,362 45					
	$1,500 00				
		$155,088 00	153,272 46	$1,815 54	
2. Regular supplies, including fuel, oil, and small stores	$125,000 00				
Transferred—					
From Bureau of Gas	20,000 00				
		145,000 00	144,999 38	62	
3. Repairs to machinery, including the conveyance of workmen incident thereto		50,000 00	47,585 83	2,414 17	
4. Maintenance and repairs to buildings, grounds, and reservoirs		65,000 00	62,448 79	2,551 21	
5. Maintenance and improvement to the distribution, including purchase of material and cost of labor connected therewith and expenses incident thereto	$170,000 00				
Transferred from Bureau of Gas	10,000 00				
		180,000 00	179,656 78	343 22	
6. Supplies and labor at City Repair Shop		50,000 00	49,057 67	942 33	
7. General and incidental and contingent expenses, including $650 for keep of horse for Chief Engineer, and $750 for keep of horses for General Superintendent and Assistant Engineer.	$15,000 00				
Transferred from Item 1	1 362 45				
	$16,362 45				
Transferred to Department of Public Works	500 00				
		15,862 45	15,419 72	442 73	
8. Extensions		500,000 00	491,131 01	4,106 38	4,762 61

Appropriations and Expenditures—(Continued).

Appropriation Decembes 31, 1887.	Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Item.				
9. For new mains in front of new buildings, appropriation	$50,000 00	$47,033 36	$2,966 64	
Special Appropriations—				
Balance from Item 4 of 1887, carried over to meet contract of John McParland for the erection of a retaining wall at Fairhill basin	3,302 40	3,302 40		
For maintenance and repairs to buildings, grounds, and reservoirs, transferred from surplus of Gas Loan, No. 9, November 12, 1887	13 70		13 70	
For the Extension of Works—				
Appropriation from Gas Loan, No. 9, May 18, 1886, carried over to meet contract of Holly Manufacturing Company for pumping engine	13,826 87		26 87	$13,800 00
Total	$1,228,093 42	$1,193,907 40	$15,623 41	$18,562 61

The expenditures are given in detail in the report of Mr. J. T. Hickman, Chief Clerk, Appendix B.

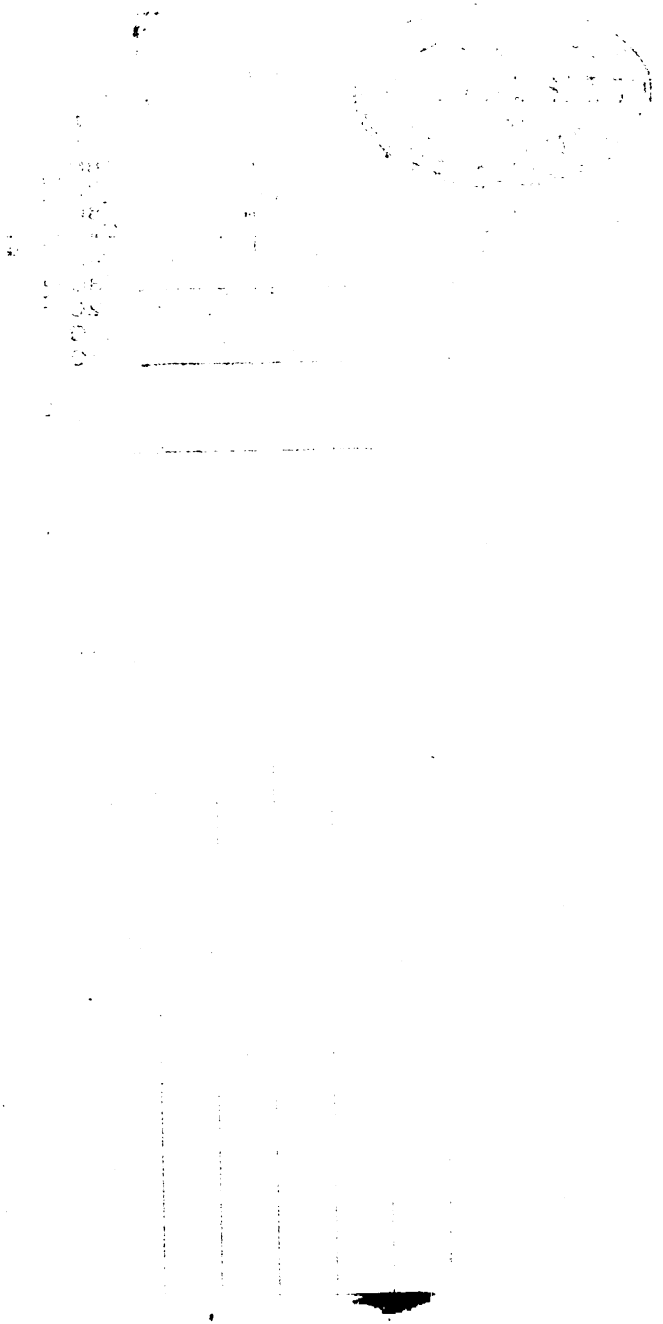
PUMPAGE.

The performance of the pumps at the several stations has been as follows:

Total Gallons Pumped during 1888.

Fairmount		11,241,113,108	
Spring Garden		15,701,108,746	
Belmont		3,668,958,241	
Roxborough		2,350,415,393	
Chestnut Hill		94,910,340	
Frankford		2,409,718,606	
Kensington		1,267,154,007	
Total			36,733,378,441
Supplementary Lift.	Roxborough	15,922,112	
	Mount Airy	319,462,875	
Total			335,384,987
A grand total of			37,068,763,428

Months.	Water Power.	Steam Power.	Totals.	Gallons per day. Average.
January	943,483,930	1,545,120,390	2,488,604,320	80,277,558
February	825,541,851	1,582,453,832	2,407,995,683	83,034,333
March	969,406,801	1,609,330,261	2,578,737,062	83,185,066
April	934,164,842	1,670,328,948	2,604,493,790	86,816,459
May	1,207,993,239	1,857,821,381	3,065,814,620	98,897,245
June	967,911,722	2,550,818,811	3,518,730,533	117,291,017
July	591,832,203	2,891,147,907	3,482,980,110	112,354,197
August	740,300,627	2,907,538,557	3,647,839,184	117,672,231
September	1,012,421,257	2,457,900,040	3,470,321,297	115,677,376
October	1,073,782,156	2,488,258,803	3,562,040,959	114,904,547
November	968,644,197	2,270,731,410	3,239,375,607	107,979,186
December	1,005,630,283	1,996,199,980	3,001,830,263	96,833,234
Total	11,241,113,108	25,827,650,320	37,068,763,428	101,280,774



Total number of gallons in excess of the preceding year, 4,641,983,663, or over 14 per cent.

The increase in the steam pumpage was 3,506,607,188, or nearly 16 per cent.

The increase by water power was 1,135,376,475, or 11 per cent.

The daily average was 101,280,774, an increase over 1887 of 12,440,282, or 14 per cent.

The maximum quantity pumped in one day was 138,674,777 gallons on September 22d. This represents a body of water equal in area to Washington square, and 63 feet high.

The minimum, 48,375,621 gallons, was pumped on January 2.

Thirty per cent. of the pumpage was by water power and seventy per cent. by steam—the same as last year.

With this increased pumpage no trouble whatever was experienced in keeping up the supply even while the pumps were stopped on account of muddy water in the river.

Pumpage Table for the year 1878 to 1888, Inclusive.

Year.	No. of gallons pumped to Reservoirs, etc.	No. of gallons pumped 100 feet high.	Cost per million gallons pumped 100 ft. high.	Gallons per capita per day	Estimated Population.
1878	19,101,664,332	27,668,619,658	$6 56	64	813,000
1879	19,894,101,515	29,787,829,909	5 07	65	830,000
1880	21,120,792,386	31,686,275,272	5 51	68	847,000
1881	22,721,014,838	34,238,528,111	6 88	71	869,000
1882	24,691,440,430	37,873,302,258	6 66	76	890,000
1883	25,284,957,251	37,949,320,701	6 51	76	911,000
1884	25,495,179,353	39,001,865,294	5 54	74	932,000
1885	25,165,020,072	39,308,901,886	4 70	72	953,000
1886	28,658,966,569	46,255,361,203	4 13	80	975,000
1887	32,426,779,765	51,289,948,331	3 99	89	995,000
1888	39,068,763,428	59,483,831,199	4 49	100	1,020,033

The increase in the cost of pumpage was due principally to the advance in the price of coal, which was 47½ cents more per ton than during the previous year; the increase in the cost of coal being 20 per cent., while the extra cost for pumpage was only 13 per cent.

RAIN-FALL.

The rain-fall for Eastern Pennsylvania, taking the average of nineteen stations, was 50.8 inches.

The greatest average monthly rain-fall was in September—7.17 inches.

The greatest monthly rain-fall was observed at Easton in September—11.75 inches.

The least average monthly rain-fall was in June—1.79 inches.

The greatest rain-falls in Philadelphia were on August 23d, when 2.465 inches fell in 14 hours and 45 minutes, and on September 20th, when 1.35 inches fell in 4 hours and 26 minutes.

FLOW OF THE SCHUYLKILL.

The area of the water-shed is about 1800 square miles. The rain-fall taken at fifty inches gives a precipitation for this area of 209,088,000,000 cubic feet, and a daily average of 571,278,688 cubic feet, or 4,273,164,586 gallons.

An accurate weir measurement of the flow of one of its tributaries, the Perkiomen, shows that fifty per cent. of the rain-fall reaches the stream.

The same percentage applied to the entire river gives a daily flow of 2,136,582,293 gallons. This amount cannot be accounted for at Fairmount. Some of the water is consumed by the cities along the banks, and the data used in making the calculation is not exact, on account of the flash-boards on the dam having been broken down in places by the ice during the winter, and also for want of exact information in reference to the quantity of water required for motive power.

The water pumped from the Schuylkill during 1888 was 37,068,763,428 gallons.

The motive power requires at least thirty gallons to raise one into the reservoirs, and some experiments made in 1878 indicate that a larger quantity is actually used.

The water consumed for this purpose would be about 337,233,393,240 gallons.

There were 148 days when water was wasted over the dam, the quantity being approximately equivalent to a body of water 1200 feet long and 91 feet high, flowing for 24 hours, or 225,376,791,920 gallons; the average for 148 days being 1,522,816,161 gallons, and for 366 days 615,783,584 gallons.

The lockage would be about 7,000,000 gallons daily. From the above the average flow of the river is estimated to be 1,645,467,073 gallons, or nearly 39 per cent. of the rain-fall.

QUALITY OF THE WATER.

After a general rain in the valley the Schuylkill is at first yellow from the flow of the nearer streams which run principally through cultivated land. It is afterward dark or black from the washings of the culm piles in the coal regions.

In January the breaking of the Milldale Rolling Mill dam, one-and-a-half miles above Port Clinton, was the cause of the black appearance of the water at that time. The coal dirt and slush that had accumulated in the dam were brought down by the freshet produced by the break.

When the river is discolored the pumps are stopped wherever practicable, and the supply drawn from the stored water in the reservoirs. This arrangement has enabled the Bureau to furnish clear water to the largest portion of the city, that part supplied by direct pumpage being alone troubled with water of objectionable appearance. An arrangement is being perfected by which this section will also be given clear water.

At the Kensingon station very little water, only about three per cent., was pumped.

It was found to be impossible to keep up the supply satisfactorily without occasionally running these works. Regular pumping was stopped on August 23d, after which there were but few days, three in September and one in October, when the works were run while making repairs at the reservoir. Some typhoid fever made its annual appearance in the northern section of the city, and, as usual, it was attributed to the water supply. Other cities furnished with the best water are not free from its attacks, and it is believed that a careful investigation of each case would show that most of them were due to causes other than the water supplied by the city.

During the year the intercepting sewer was completed, and the mill owners of Manayunk notified to turn their refuse therein. Some have obeyed, and in time, I presume, all will be compelled to do so.

An efficient officer should be employed to police the river above the dam and prevent persons from throwing noxious matter into the stream, and to report all violations of the law.

The law making it an offence to pollute the Fairmount pool should be amended to include the Flat Rock Dam, and even farther up the river.

PUMPING STATIONS.

In general the stations are all in good order, and, as far as possible, the buildings and grounds have been kept in first-class condition. The machinery, by proper attention, has been maintained in excellent repair and ready at all times for service.

Fairmount.

At this station there are seven turbine wheels, driving thirteen pumps.

Two of the wheels, Nos. 1 and 3, pump only into the Fairmount reservoir; the others into Fairmount or Corinthian avenue, as required.

The daily capacity is as follows:

No. 1 wheel	2,000,000
No. 3 wheel	8,000,000
No. 4 wheel	8,000,000
No. 5 wheel	8,000,000
No. 7 wheel	6,000,000
No. 8 wheel	6,000,000
No. 9 wheel	6,000,000
Total	44,000,000

The maximum pumpage for one day was 40,729,907 gallons. The quantity pumped during the year was 11,241,113,108 gallons, a daily average of 30,713,424 gallons, and an increase of 10 per cent. over the preceding year.

The difference between the calculated capacity and the actual pumpage is accounted for as follows: stoppage of the pumps during freshets and muddy water, and stoppage for repairs or full basins.

The reservoir, with a capacity of 26,000,000 gallons, supplies that part of the city below South street, comprising the First, Second, Third, Fourth, Twenty-sixth, and Thirtieth Wards. When full the basin is 96 feet above city datum, and the highest ground in this part of the city is 39 feet above the same reference level.

The basin holds about three days' supply, which can be increased by drawing from higher reservoirs, so that at present it seldom happens that water of objectionable appearance is given to this district.

As the population and the consumption increases, the basin will be too small to hold the water a sufficient length of time to deposit its sediment. The area supplied must then be contracted, or arrangements made to pump all water into the East Park reservoir, and draw from thence into Fairmount.

The improvements and repairs to the buildings and grounds have been of the usual character, with the addition of a new asphalt pavement and new granite curbstone on Twenty-fifth street, from Spring Garden to Green streets.

After the completion of the tunnel of the Schuylkill River

East Side Railroad, this footway, along the reservoir wall, was left unpaved and the city was obliged to put the footwalk in order. The dead and dying trees were removed from around the reservoir, and in their places young trees will be planted.

Some improvements were made to the machinery. Turbine No. 4 was fitted with a Geyelin glass suspension running in oil, by which the weight of the moveable wheel and its attachments, amounting to 37,000 pounds, is taken from the step below the water line and placed in sight on the turbine case.

The weight on the new step is about 100 pounds on each square inch of bearing surface.

The old step was lubricated with water from the pumping main, and when the pipes conveying the water became choked, the wood was liable to be burned and the wheels damaged.

The difficulty of making repairs under water suggested this new device, which works very satisfactorily.

In the pumps of No. 9 wheel, brass valve seats with 180 four-inch rubber valves were substituted for the old Cornish valves.

Similar improvements will be made to the other pumps and wheels as opportunity offers.

The machinery was overhauled, wheels re-cogged and other needed repairs attended to.

The crib work in front of the dam is in a dilapidated condition and to put it in good order will cost about $10,000.

Several improvements can be made to facilitate the management of the works and to prevent the waste of water. Whenever the wheels are stopped the head gates to the flume should be closed. To do this quickly the gates must be operated by water power, when they can be shut in a few minutes instead of the hours now required to move them by hand.

The power of wheels Nos. 3, 4 and 5 is sufficient to permit of the enlarging of their pumps and increasing their capacity. Two new wheels with single pumps can be placed in the old wheel-house to take the place of others during repairs, and to utilize some of the water now wasted over the dam.

Spring Garden.

This station, located on the Schuylkill river at Thirty-third street and Girard avenue, is in two plants, styled respectively the Old and New Stations.

The former, built by the Spring Garden District before consolidation, contains, now, four engines with a united pumping capacity of sixty millions of gallons.

One Gaskill engine of 20,000,000 daily capacity.
One Cramp engine of 20,000,000 daily capacity.
One Worthington engine of 10,000,000 daily capacity.
One Simpson engine of 10,000,000 daily capacity.

The new station erected in 1884 contains two Worthington engines of fifteen millions of gallons each. The total for both stations being 90,000,000 gallons.

The maximum daily pumpage was on July 29, when 85,214,817 gallons were delivered into the reservoirs or into the mains.

The total pumpage for the year was 15,701,108,746 gallons, a daily average of 42,899,204.

Forty-three per cent. of the entire city supply was pumped at this station. The water was delivered into the East Park, Corinthian avenue, Spring Garden and Lehigh avenue reservoirs and, also, directly into the pipes of a high service distribution. The new engine and boilers have given entire satisfaction.

The buildings and grounds were kept in a very attractive condition. New asphalt foot-walks were laid and a much needed Belgian block cart-way constructed.

The coal shed and railway track were raised thirty inches, and the capacity of the bins increased three hundred tons, making a total storage of 1,000 tons.

A new thirty-four feet Fairbanks' track scale was put in and enclosed in a shed.

The usual repairs were made to the machinery and boilers to keep them in good order and efficiency.

The new boilers which are fired internally gave some trouble when being started. The water in the bottom below the fire remained cold for several hours, until a circulation was established. The upper part being hot and the bottom cold caused unequal expansion and leaking joints in the outer shell, and more time was required to get up steam than if the water circulated freely. Every boiler was re-caulked several times, necessitating also the removel and repair of the non-conducting cover. Hydrokineters were attached to each boiler after which no trouble from unequal expansion was experienced.

The tubes were removed from some of the boilers, cleaned, safe-ended and replaced.

Preparations were made to pump from the East Park reservoir the water required for high service, instead of from the river as at present, but the contractor for the castings failed to deliver them and the work has been necessarily postponed. There is room in the old building for one large engine, and it will not be long before its services will be required.

The stand-pipe requires repainting and the grounds around it should be made attractive. This has been impossible hitherto on account of the laying of large mains.

The inner pipe was found to be broken and had been repaired.

At the Spring Garden basin, Twenty-sixth and Master streets, an iron fence has been put up and the buildings encroaching on the city property removed or their owners notified to do so. This change was not effected without great opposition from residents of the vicinity.

The grounds have been cleaned up, and the banks repaired, but much yet remains to be done to improve the appearance of the place. This basin needs cleaning; the mud on the bottom is several feet in depth.

The Corinthian avenue basin, at Poplar street and Corinthian avenue, is in fair condition. It was expected that an iron fence would have been placed on the south of Parrish street front, but after enclosing two other reservoirs there was not sufficient left for this basin.

Belmont.

This station is located in the West Park near the Reading Railroad bridge on Pennsylvania avenue. It contains three Worthington engines, with a combined capacity of eighteen millions of gallons, and is used exclusively for the supply of West Philadelphia, or the Twenty-fourth and Twenty-seventh Wards.

The total pumpage during the year was 3,668,958,241, a daily average of ten millions of gallons.

The largest pumpage was on September 23, when 15,874,-701 gallons were put into the basin.

The principal repairs have been to the stack, which was braced with iron rods, and to engine No. 3, which received a new plunger, rod, a new head on one plunger and one new cylinder head, all necessitated by the breaking of one of the plungers.

A new set of boilers is required in place of the old cylinders which have been in use for nineteen years, and only kept serviceable by expensive patching and repairs.

The Belmont reservoir is on George's Hill, in the West Park. It holds, when full, about forty millions of gallons, or three days' supply without pumping. This is scarcely sufficient to give subsided water at all times, and it must soon be enlarged. When the river is very muddy the pumps are stopped and the stored water alone used, but when the water continues riley for more than three days the bad water must be pumped into the basin to keep up the supply.

Roxborough.

This station is situated on the Schuylkill at Flat Rock dam. It was built in 1866, and at present contains two Worthington engines, with a combined capacity of twelve millions, and a Cornish engine not in service.

The total pumpage for the year was 2,350,415,393 gallons, and the daily average 6,421,900 gallons. The maximum

daily pumpage was on June 28, when 12,004,979 gallons were delivered to the reservoirs.

These works supply Manayunk, Germantown, part of Chestnut Hill and a portion of the Twenty-eighth and Twenty-ninth Wards.

The water is pumped into either the Roxborough or Mount Airy reservoir: The former is situated on Shawmont avenue near Ridge avenue.

Its capacity is 12,838,000 gallons, and the water level is 366 feet above city datum. It holds about four day's supply, when the engines are stopped.

Mount Airy basin is situated on Allen's lane near Germantown avenue. Its level is 363 feet. Its capacity is 4,500,000 gallons, which is less than one day's supply. Both reservoirs combined will not furnish water without pumping for a greater period than three days, so that very little time is allowed for the water to subside. A larger reservoir will soon be required, and a favorable location is on Allen's lane east of Ridge avenue.

At the works a new brick stack was built, by contract, from plans furnished by the Bureau. The height is one hundred feet, and its internal diameter, five feet.

The Marine boilers, four in number, will be moved and connected with this stack.

Engine No. 2 had a general overhauling, but required no special repairs.

Engine No. 3 had two plunger rods broken which were replaced with new ones.

A thirty-inch stop was put on the pumping main outside of the house.

Boilers Nos. 1 to 4, inclusive, were cleaned, the tubes taken out, and being too thin for safety, were replaced with new ones.

Boilers Nos. 5 to 7, inclusive, were torn down and re-set.

The coal bins and side track were found to be partly on ground belonging to the Reading Railroad Company. Plans

were prepared for a new shed; bids were received, but the work was not done, there not being sufficient money available for the purpose.

At the reservoir is an auxiliary station used to pump water into tanks at Manatawna for the supply of upper Roxborough. These works are in good order.

At Mount Airy is another auxiliary station for the supply of Chestnut Hill and upper Germantown. The maximum pumpage was 1,285,000 gallons on June 22. The engines are not properly constructed for the work they have to do, and there being no storage, (the water being pumped directly into the mains) when the fire plugs are opened the engines become unmanageable.

A stand-pipe or tank is a necessity and must be provided for in the near future.

One engine has a surface condenser attached while the other has not.

A condenser plant for the high pressure engine will cost about one thousand dollars. It will make the engine more effective and avoid the nuisance caused now by the exhaust steam.

Chestnut Hill.

This plant was erected by the Chestnut Hill Water Company and was purchased by the city in 1873. Its capacity is about one million gallons. The water is pumped from a spring into a tank holding 40,000 gallons.

These works are in fair condition.

Frankford.

This station is on the Delaware river at Lardners Point, a short distance below Tacony. It contains two ten-millions engines, but there being but one pumping main, the capacity is virtually limited to ten millions. The total water pumped during the year was 2,409,718,606 gallons, a daily average of 6,583,930.

The maximum pumpage was on June 20, when 10,195,206 gallons were raised into the basin.

The machinery consists of one Cramp engine, and one Corliss engine built by Wetherill & Co. of Chester.

The former is in first class order, but the latter is too light for the work. The piston of the low pressure cylinder broke and a new one was substituted. The high pressure cylinder head was then found to be cracked in the stuffing box. It was patched up by shrinking on a wrought iron band.

This engine should be taken to some station with less lift and a heavier engine put in these works.

The boilers were re-covered with John's asbestos covering and put in good condition.

The reservoir is at Wentz Farm on Oxford pike, or old Second street.

It is 165 feet high, and holds when full 36,000,000 gallons and supplies Frankford and most of the Twenty-fifth Ward. It stores about five days' supply.

Considerable repairing was done, caused by the washing out of the lining and clay around the inlet pipe.

There is a leak in the stop-house, the water coming through the stone walls, but a drain pipe conducts the water to a ditch east of the road, and it is not believed that any damage is done to the surrounding property because of any leak.

Kensington.

This station is on the Delaware River, at Otis street wharf. It was built by the Old Kensington District about 1850. At present it contains but one engine of 6,000,000 capacity. The water is taken from the channel of the river, 200 feet from the end of the wharf, but owing to complaints, most of them imaginary, about the quality of water, the pump is not used except in cases of necessity.

The total pumped during the year was 1,267,154,007 gallons, a daily average of about three millions. The machinery

and boilers are kept in a serviceable condition, but no repairs are made, except those necessary to keep the place in order.

The basin is located on Lehigh avenue, between Sixth and Eighth streets. It is 114 feet high, and holds 26,000,000 gallons. It is supplied from the Spring Garden and Frankford stations, somewhat inadequately during the very warm weather, when it was found necessary to assist by starting the pump at Otis street wharf.

An iron fence was placed on three sides of this reservoir, and the footwalk on Somerset street paved with bricks.

A new and large main from the East Park reservoir must be laid before the Kensington works can be entirely dispensed with.

East Park Reservoir.

The small section completed in the fall of 1887 has been in use during the year. No leak has as yet been noticed. The banks stood the winter very well, except where rain water soaked down behind the lining, and caused it to sink in a few places. The top of the bank has been covered with an asphalt walk to throw all rain water into the basin, and it is believed this trouble will not happen again.

The second or northeast division was completed during the year.

The engineer corps began work early, but the actual work of preparing the bottom was begun on April 2d.

The grading and puddle lining was done by the city. All hauling, the furnishing of the clay, the concrete lining of the bottom, the brick lining of the slopes, and the asphalt pavement on top of the banks, were done by contract.

Sixty thousand cubic yards of gravel were hauled out, and 123,984 loads of clay brought from the outside and used for puddle.

On May 1st, the slopes having been previously rebuilt, the brick lining was begun. This was a layer of straight hard paving bricks, on edge, on two inches of cement mortar.

The concrete lining on the bottom was begun June 5th, and completed October 19th. The concrete lining was four-and-one-half inches thick, composed of one part of the best Portland cement, two of bar sand and four of broken stone, all thoroughly mixed and well rammed.

A vulcanite walk was laid on top of the bank and a substantial fence put up.

The area of the bottom	172,044 square yards.
The area of the slopes	29,710 square yards.
Elevation of bottom	108.375 C. D.
Elevation of water line	133.4 C. D.
Elevation of top of bank	137.385 C. D.
Distance around inside top of slope	5,231 feet.
Distance around foot of slope	4,975 feet.

Capacity 306,869,805 gallons.
The total cost was $405,837.35.
The water was let in October 23d.

The completion of this part of the storage reservoir will enable the Bureau to discontinue pumping when the Schuylkill is muddy, and to furnish settled water to the largest portion of the city, when the necessary mains are provided.

Coal.

Anthracite Pea coal was used at all of the stations. Its price per ton of 2240 pounds was as follows: Spring Garden, $2.85; Belmont, $2.85; Roxborough, $2.85; Frankford, $2.95; Kensington, $2.95; and Chestnut Hill, $3.15. The contractor delivered the coal in the bins.

During the early part of the year, owing to a strike, the contractors were unable to deliver sufficient fuel at some of the stations to keep them in service, and some bituminous coal was purchased, and its steam-making qualities compared with anthracite pea.

At Belmont the cost of raising one million gallons two hundred feet high was $6.26 with anthracite pea coal and $5.66 with bituminous. One ton of the former pumped 455,414 gallons and one ton of the latter 547,142 gallons, a

difference of 21 per cent. in favor of bituminous, which cost $3.10 as against the pea coal at $2.85. The soft coal received from the Georges Creek Colleries of the Maryland Union Coal Company was of superior quality.

At the Kensington station some Columbia bituminous coal, the same quality as used by the city ice boats, was purchased, and a similar test made. The cost per million gallons raised 114 feet high was for anthracite $3.38, and for bituminous $3.62. One ton of the former pumped 872,836 gallons, and one ton of the latter 887,420 gallons, a difference of less than two per cent. in favor of bituminous, which cost $3.14 per ton. No trouble was experienced at either station in burning the soft coal. The firing in each case was similar and the evaporative power of the boilers about the same. Worthington engines were used.

Previous to the purchase of bituminous coal at Kensington station, some coke from the City Gas Works, at six cents per bushel, was received and tested with anthracite pea at $2.95 per ton.

Forty-nine and one-half tons of the latter lifted 43,250,550 gallons 114 feet high, costing $3.37 per million gallons.

The coke, 2,300 bushels, with hauling and extra men for handling, costing $219.50, raised 42,958,881 gallons.

Cost of coke, per million gallons	$5.10
Cost of pea coal, per million gallons	3.37
Difference in favor of coal	$1.73

The difference for a days' pumping, seven millions, would be $12.11; for the year, $4,432.36.

Coal will be cheaper than coke until the price of the former exceeds $4.61 per ton or the price of the latter reduced to two and one-half cents per bushel.

For repairs and operation of the works in detail, see report of Mr. F. L. Hand. Appendix C.

DISTRIBUTION.

Mains Laid.

A forty-eight-inch pumping main was laid from the Spring Garden stand-pipe to the East Park reservoir.

A thirty-six-inch supply main from the same basin to the Spring Garden engine house was begun late in the season; its object is to convey the stored water to the engines to be pumped to the higher levels now given water direct from the river.

A sixteen-inch supply pipe was laid on Dickinson street, from Moyamensing avenue to Broad street, connecting there with a twenty-inch main. This doubled the pressure in its immediate vicinity and greatly increased the supply in that part of the city south of Washington avenue and east of Broad street.

A sixteen-inch supply pipe was laid on Fairmount avenue, from Twentieth to Twenty-second street.

At the Roxborough reservoir a short piece of twenty-inch pipe was put in to enable the engines to pump direct to Manayunk and Germantown, while the reservoir is being emptied for repairs.

On March 8th water was let into the thirty-inch main laid from the Wentz Farm reservoir to Sixth and American streets, for the supply of the district bounded by Sixth and American streets, north of Lehigh avenue.

On April 5th this district was extended south to Jefferson street, but the result was not satisfactory, and it was changed to Susquehanna avenue, where it now remains.

Some water was drawn at night through this main into the Lehigh avenue reservoir to assist the pumps at Spring Garden when the Kensington works were not in use.

In order to abandon the latter station an attempt was made to utilize both engines at Frankford, but the single thirty-inch pumping main was too small, and the result was the bursting of a breeches pipe and the blowing of a number of the joints.

While repairing this main, a check-valve was moved from an objectionable location and put where it would be of some service, nearer the basin.

A break occurred in the twenty-inch main in Sixteenth street below Green, which done considerable damage to houses in the vicinity.

A forty-eight-inch main in front of the Spring Garden engine-house opened at one of the joints. The only damage done was the washing of dirt into the building. The pipe had been properly shored, but for some purpose the timbers were taken out and not replaced.

The submerged main across the river from Belmont works was seriously damaged by the stone thrown on it when the park-drive was made. An attempt to repair it in its present condition would be useless. It must be relaid for a considerable distance or entirely abandoned.

This main was, no doubt, originally laid in a straight line but now it is more like a worm fence, owing, probably, to the joints moving in a slight degree when the pipe was under pressure.

The service pipes laid amounted to 112,709 feet, and the mains to 8,838 feet. With connections and other new work the total amount is 133,517 feet, or 25 miles, 1,517 feet. The total distribution in the city amounts to about 901 miles. Nineteen thousand and two feet of pipes of various sizes were used for relays and about 5,000 feet for repairs.

Fire Hydrants.

New style fire hydrants, to the number of 558, and 21 old style were set in new locations, and 186 new and 103 old style were substituted for defective hydrants, making a total of 744 new style and 124 old style put in during the year.

The total number of hydrants in use is about 6,928, of which 2,280 are of the new pattern.

Drills.

Eight thousand, seven hundred and eighty-eight new service attachments were put in.

Meters.

Ten meters have been set in new locations. Thirty-nine were removed for various reasons and sixteen discontinued.

The total number in use December 31 was 267.

The meters have shown that the present method of assessing water rates by the appliances for the use of water is unjust to many consumers and a great loss to the city in some cases.

CONSTRUCTION AND REPAIR SHOP.

The machine, blacksmith and pattern shop, belonging to this Bureau, is located at Twelfth and Reed streets. It contains a good assortment of tools for manufacturing and repairing fire-plngs and stop-valves, and for doing most of the repairing to the pumping machinery.

A few new tools will enable us to do all this work, except repairs to the boilers. The following additional tools are required: one bolt cutter, one shaping machine, one Fox lathe, one large lathe, and a band saw and planer for the pattern shop.

In the blacksmith shop are four forges and one steam hammer.

The following are some of the most important articles manufactured during the year: 627 fire hydrants, 701 stop-valves, of various sizes, from 4 to 48 inch, and all tools required for pipe-laying.

A fair valuation on all articles manufactured and repairs will show a profit of about $8,000.

The following table shows the yearly work, except repairs, from 1878 to 1888, inclusive:

Year.	Fire Hydrants.	Stop Valves.	Frames and Covers.	Ferrules.
1878	332	281	393	3,425
1879	276	198	60	715
1880	314	149	212	3,649
1881	435	237	372	3,085
1882	596	336	596	3,506
1883	729	328	423	4,799
1884	198	367	588	4,966
1885	451	667	653	7,115
1886	626	953	927	8,480
1887	606	549	466	8,041
1888	627	701	1,125	10,005

For work in detail, see report of Mr. W. F. Courtney, Appendix E.

HYDROGRAPHIC WORK.

To obtain the proper data on which to prepare estimates for a possible future water supply, the gauging of the stream flows of the Perkiomen, Tohickon and Neshaminy creeks have been continued. The results have been compiled and appear in the report of Mr. John E. Codman. Appendix F.

REMOVAL OF MAIN OFFICE.

On August 30, the office of the Bureau was removed from the hall at Thirteenth and Spring Garden streets, where it had been inconveniently located for fourteen years, to the northeast corner of Filbert and Juniper streets.

It is now near the other Bureaus of the Department, which is a great convenience, not only to ourselves, but to the public.

FILTRATION.

The advisability of filtering the water or of building large subsiding basins are questions which must soon be determined. Already some parts of the city have scarcely sufficient storage to permit the pumps to remain idle when the river is muddy. While apparently extravagant prices are asked for filtering plants, they would probably be more economical in first cost than new basins, and the maintenance of the former but little more than the cost of repairs to the latter. If filtered water be delivered to the basins the expense of cleaning would be avoided and their entire capacity be available, while now several feet in the bottom are useless on account of the accumulation of sediment. While subsidence removes only the inorganic matters held in suspension, it is quite probable that a properly constructed filter, with the assistance of some harmless coagulant, will remove a greater part of the organic matter held in solution. Water containing the least amount of organic matter would, no doubt, be better for storage, and living organism would not form as rapidly as in that pumped directly from the river and stored in the basins. It has been noticed, in some of the impounding reservoirs of the Schuylkill Navigation Company, situated on the tributaries of this river, that while near the surface the water would be apparently good, in the deep places it would be very foul. The same result might happen to unfiltered water stored for a long time in our own basins, but it is not probable, because the bottom water is drawn first for consumption, while in the impounding reservoir that at the bottom is seldom disturbed.

SUMMARY OF REPAIRS

required at and improvements suggested for the several stations.

FAIRMOUNT.

The crib work in front of the dam is to be repaired and covered with a new oak apron. A new cap log is needed for

the entire length of the dam, and the concrete between the old and new dams must be renewed in places.

The roof of the mound-dam mill house leaks badly and should be covered with some improved pavement.

A new fence is needed around the basin and terrace.

An asphalt pavement should be laid on the walks, especially those on top of the banks around the reservoir.

The pump valves of Nos. 3, 4, 5, and 8 should be altered to rubber valves on brass seats, in place of the present Cornish valves.

A new gate is required for No. 1 wheel. All of the turbines should be furnished with a glass suspension.

The head gates should be raised and lowered mechanically, instead of by hand as at present.

The pumps of wheels Nos. 3, 4 and 5 should be enlarged or the turbine wheels reduced in area to economize the flow of water. The gates at the bottom of the turbines have been broken and they allow the water to waste through when the wheel is not running. Gates could be placed on top of the wheels with less expense than the renewing of the old gates, for which a coffer dam would be required. Two new turbines with single pumps should be put in the places formerly occupied by breast wheels No. 2 and 6, now removed.

Spring Garden.

Some of the boilers are to be reset and furnished with new tubes.

On the east side of the building, the stack, which is now badly cracked, should be rebuilt and raised similar to the one on the west side. The grounds in front of the old station and around the stand-pipe are to be graded and improved in appearance. The stand-pipe is to be painted.

Two engines are to be provided with connections suitable for pumping subsided water from the East Park reservoir to the higher ground now supplied by direct pumpage.

A new engine will shortly be required.

The Forebay walls should be raised about two feet.

Belmont.

A stone bridge should be built on the line of the railroad track to the coal sheds in place of the wooden structure which requires renewing. A dam should be built across the ravine near the works for the purpose of storing the rain water for the use of the boilers.

A brick stack should be built for four of the boilers.

Six new boilers in place of the old cylinder boilers are greatly needed.

Roxborough.

The fire room requires a new roof and ventilator.

Some of the marine boilers are to be moved and connected with the new stack.

A new coal shed must be built in place of the present structure which is now partly on ground claimed by the Reading Railroad Company.

Mount Airy.

The following improvements should be made: New coal shed built, new fence around top of basin, asphalt walks on top of banks, grounds graded, stand-pipe built of sufficient capacity to keep constant pressure on the distribution pipes, No. 1 engine altered to low pressure.

Frankford.

Necessary improvements: Grounds to be graded and fenced, new roof put on fire room.

A new engine in place of the Corliss, which is too light for the work.

Two new main pedestals for the Corliss engine.

Chestnut Hill.

Heater for feed water.

KENSINGTON.

If it be possible to abandon these works very few repairs will be required; but if not, a new coal shed should be built and some repairs made to the wharf and the roof.

CORINTHIAN AVENUE RESERVOIR.

New fence around the basin. Asphalt walks around top of banks. New fence on Parrish street front.

SPRING GARDEN RESERVOIR.

Basin cleaned, banks graded, asphalt walks around top of bank, and a brick pavement on the Thompson street front.

BELMONT RESERVOIR.

Asphalt walk and new fence around top of bank.

ROXBOROUGH RESERVOIR.

The grounds around this basin should be improved.

LEHIGH AVENUE RESERVOIR.

Brick pavement on Eighth street front; new fence and asphalt walks around the top of the bank.

WENTZ FARM RESERVOIR.

The banks generally need reconstruction and an asphalt walk laid around the top of the bank.

IMPROVEMENTS TO THE DISTRIBUTION.

First. A 30-inch main from Roxborough to Mount Airy basin cost $122,000

Second. A 48-inch main from the East Park reservoir to American street 200,000

Third. A 48-inch main from the East Park reservoir to Twenty-fifth and Spring Garden streets 150,060

Fourth. A 48-inch main on Poplar street, from Twenty-second street to Corinthian avenue..... 12,000

Fifth. A 48-inch pumping main from the Spring Garden Works to the East Park reservoir..... 22,000

Sixth. A 30-inch pumping main from Frankford Works to the Wentz Farn reservoir..... 175,000

The above are the most important, but a large number of others necessary for the proper distribution of the water will be found enumerated in the report of Mr. A. J. Fuller, A. E. Appendix D.

EXTENSION.

One section of the East Park reservoir remains to be completed. The slopes are in bad shape, having been exposed to the frost and rain for fourteen years, they are washed and worn so that they must be rebuilt on the inside. The bottom is near the proper grade except around the bottom of the slopes where the earth and clay from the banks have accumulated to the depth of four or five feet.

It is proposed to contract for the entire lining, including the furnishing and hauling of the clay. The only work to be done by the Bureau will be the leveling of the bottom and the re-ramming of the slopes.

The area of the bottom is 178,825 square yards and of the slopes 29,650 square yards. About 100,000 cubic yards of clay will be required, but a small portion of which is now in the basin.

CAMBRIA RESERVOIR.

The site of this proposed basin is not of sufficient elevation to supply the section of the city now on direct pumpage, and a higher elevation should be selected. The present site can be sold or retained by the city for a park or other municipal purposes.

EXTENSION OF MOUNT AIRY RESERVOIR.

The proposition to enlarge this basin on the north is objectionable on account of the value of the land to be taken. A site for a larger basin can be purchased for less money in another locality.

George's Hill reservoir must soon be extended to meet the increased demands for water caused by building improvements in West Philadelphia.

As several sites are available in the West Park, no trouble or expense will be required to obtain the requisite land.

At Spring Garden works, at one time, every engine was in service, leaving none in reserve. If an accident had happened to one of the larger machines some trouble would, no doubt, have been experienced in keeping up the water supply. In the near future, provision should be made for erecting, in the No. 6 room, a triple expansion engine of at least twenty millions gallons capacity.

Respectfully,

JOHN L. OGDEN,

Chief of the Bureau.

APPENDIX A.

REPORT OF E. S. HIGBEE.

DEPARTMENT OF RECEIVER OF TAXES,
BUREAU OF WATER.

Philadelphia, January 29, 1889.

JOHN L. OGDEN,
Chief Engineer.

SIR:—I respectfully transmit herewith a report of the business of this office, for the year 1888.

The total receipts from all sources, for the year 1888, paid daily into the City Treasury were	$2,114,926 50
Increase over the year 1887	84,491 89
The collection of water rents and penalties for the year 1888 amounted to	1,817,017 24
An increase over the previous year	71,075 38
The receipts from delinquent rents and penalties amounted to	15,943 58
A decrease from 1887 of	5,803 08

The decrease in this item is caused by close collections and prompt turning off of water from delinquent properties.

The receipts from fractional and meter rents amounted to	$113,550 16
A decrease from previous year of	2,389 05
The receipts from water-pipe charges amounted to	133,667 85
An increase over the year 1887	27,065 37
The receipts from search fees amounted to	4,158 25
An increase over the year 1887	745 50
Receipts through the Bureau of Water, Department of Public Works, for old material, fire connections, etc., amounted to	7,742 45
An increase over the year 1887	454 84

Amount collected through the City Solicitor's office for pipe frontage and certified to the Bureau of Water.....	$22,846 97
A decrease from year 1887.....	6,657 07
Receipts of the Department in full for the year 1888, as previously estimated by the Chief Engineer to the City Controller.....	2,000,000 00
Actual receipts for the year 1888.....	2,114,926 50
Increase over estimate.....	114,926 50

The annexed itemized tables contain full information of the detailed work of this office.

Respectfully,

E. S. HIGBEE,

Chief Clerk.

For HENRY CLAY,

Receiver of Taxes.

Total Receipts, Bureau of Water, for the Year 1888.

MONTHS.	Searches.	Delinquent Rents.	Delinquent Penalties.	Rents, 1888.	Penalties, 1888.	Fractional Rents.	Water Pipe.	Bureau of Water, Department Public Works.	Totals.
January	$258 25	$1,680 95	$150 61	.....	.....	$9,028 64	$4,460 85	$3,514 03	$19,093 33
February	259 25	712 00	106 67	$225,134 64	.....	8,830 18	1,670 93	765 30	237,478 97
March	370 25	1,165 50	171 16	352,646 82	.....	6,694 21	8,570 06	613 74	370,231 74
April	356 25	2,382 75	353 32	986,739 72	....	9,277 76	11,587 86	108 22	1,010,805 88
May	425 00	1,071 34	159 80	43,123 53	$2,156 11	14,853 99	6,404 71	237 70	68,432 18
June	388 25	514 50	77 19	61,737 73	3,084 23	9,689 54	13,694 40	431 26	89,567 10
July	339 75	824 50	84 39	12,819 75	1,782 38	14,176 08	9,623 10	804 47	40,454 42
August	247 00	242 00	36 32	21,094 42	3,158 32	8,727 41	14,452 02	180 78	48,138 27
September	305 50	257 00	38 57	27,292 48	4,062 61	5,754 05	18,378 89	81 79	56,170 89
October	446 25	1,110 00	165 43	42,269 80	6,299 73	10,255 44	17,429 47	157 70	78,133 82
November	386 00	1,855 00	278 28	7,801 00	1,161 14	11,460 94	17,821 52	429 74	41,193 62
December	376 50	2,179 50	326 80	12,772 49	1,880 34	4,851 92	9,574 04	417 72	32,379 31
Totals	$4,158 25	$13,995 04	1,948 54	$1,793,432 38	$23,584 86	$113,550 16	$133,667 85	$7,742 45	$2,092,079 53

Total receipts through the office of the City Solicitor for the year 1888	22,846 97
Total receipts of the Bureau of Water for the year 1888	$2,114,926 50
Receipts as previously estimated by the Chief Engineer	2,000,000 00

Items of Receipts under Head of "Fractional Rents."

YEAR.	Rents.	Meter rents.	Ferrules.	Repairs.	Totals.
1888	$60,055 25	$33,340 16	$18,676 00	$1,478 75	$113,550 16
1887	56,642 41	40,444 30	17,588 00	1,264 50	115,939 21
Increase	$3,412 84	.....	$1,088 00	$214 25	.....
Decrease	.....	$7,104 14	.....	.....	$2,389 05

Receipts through the Office of Bureau of Water, Department of Public Works, for the Year 1888.

January 4.....	McNamee & Young.....	Fire connection.....	$66 71
7.....	Joseph Ladley.....	Stone.....	28 80
13.....	Wm. P. Oglesby.....	Repairing pipe.....	3 30
18.....	Pennsylvania R. R. Co.....	Repairing stop.....	9 02
25.....	Summers & Co.....	Old material.....	450 40
25.....	A. Purves & Son.....	" "	405 11
26.....	Bussenius & Cunliffe.....	" "	1,992 08
26	Baltimore & Ohio R. R. Co....	Removing fire hydrant.....	40 86
30.....	Summers & Co.....	Old material.....	10 65
30.....	Henry Snyder.....	Rent Fairmount.....	450 00
31.....	S. May & Co.....	Fire connection.....	56 10
February 6.....	" "	Locating leak	20 50
6.....	" "	Repairing pipe.....	55 18
8.....	Philadelphia Traction Co.....	Altering pipe.....	418 85
10.....	Pennsylvania R. R. Co.....	Fire connection.....	72 43
11.....	Baltimore & Ohio R. R. Co....	Supply "	82 21
16.....	Philadelphia Abattoir.....	Altering "	116 13
March 2.....	Powell & Bro.....	Fire "	65 90
8.....	Randall & Bro.....	" "	84 63
14.....	A. Purves & Son.....	Old material.....	150 38
15.....	J. E. Hanifen & Co.....	Fire connection.....	64 04
24.....	James Wright.....	" "	71 87
24.....	Harrison, Frazier & Co.....	" "	115 43
28.....	Warrant	Overdrawn.....	40
31.....	Aaron Jones & Sons	Fire connection.....	61 09
April 7.....	John Kerrigan.....	Stone.....	14 75
7.....	H. C. Ayer.....	Repairing main.....	21 42
7.....	John Kerrigan.....	" fire hydrant.....	9 58
18.....	H. C. McTague.....	" pipe.....	43 74
18.....	" "	" "	18 73
May 2.....	Watson & Robinson.....	Fire connection.....	76 58
8.....	David Sykes.....	" "	64 38
18.....	Wm. Noelsch.....	Setting meter.....	24 22
29.....	Taylor Bros.....	Fire connection.....	72 52

Receipts through the Office of Bureau of Water, Department of Public Works, for the Year 1888.

June 4	Sheppard Bros	Repairing stop	2 50
9	Penn Match Co	Fire connection	67 53
12	Eastern Penitentiary	Supply "	318 24
13	Peter Deehan	Renewing fire hydrant	32 39
16	Haines, Jones & Cadbury	Drawing ferrules	10 60
July 9	Henry Snyder	Rent Fairmount	450 00
10	Harold R. Lewis & Co	Fire connection	57 63
10	Market Sq. Presby. Church	Motor "	81 88
10	Thomas, Henry & Son	Fire "	64 71
11	Carey & Bro	" "	65 47
24	Pennsylvania R. R. Co	" "	84 78
August 1	Dougherty & McGahey	Repairing main	26 60
16	James Kitchenman	" fire connection	3 05
28	A. J. Drexel	Supply connection	79 55
30	Underground Electric Co	Shutting off water	2 80
31	Wm. G. Pennypacker	Fire connection	68 78
September 11	Wm. H. Brown	" "	80 59
29	Warrant No. 2444	Overdrawn	1 20
October 4	Robt. Boon & W. F. Raynor	Stone	32 00
6	Joseph Ladley	Stone	73 20
19	Phila. & Reading R. R.	Repairing leak	2 50
31	Wm. F. Raynor	Stone	50 00
November 2	Chas. A. Porter	Shifting pipe	24 86
5	Philadelphia Traction Co	Repairing main	86 99
12	Berkshire Manuf. Co	Fire connection	63 79
16	E. P. Riley	Old barrels	16 40
16	Wm. F. Raynor	Stone	3 50
22	B. Hammell & Co	Fire connection	70 31
24	Robt. Smith Brewing Co	Supply "	85 60
27	W. H. Reed, M.D	Setting meter	78 29
December 14	Boyer Bros	Fire connection	69 66
15	J. P. Holt	" "	55 33
15	Henry J. Becker	Supply "	23 08
15	" "	Relaying pipe	54 97

Receipts through the Office of Bureau of Water, Department of Public Works, for the Year 1888—(Continued).

18.....	McNeely & Co.....	Fire connection.....	70 46
18.....	Philada. & Reading R. R.....	Supply "	4 63
18.....	Watson & Peale.....	" "	65 47
20.....	Pennsylvania Trust Co.....	New stop box.....	6 50
26.....	B. F. Riley.....	Old barrels	23 80
31.....	Samuel Josephs.....	Renewing fire hydrant.....	43 57
31.....	Warrant No. 2448.....	Overdrawn.....	25
		Total.....	$7,742 45

Comparative Statement of Receipts, Bureau of Water, Years 1887 and 1888.

Year.	Searches.	Delinquent Rents.	Delinquent Penalties.	Rents.	Penalties.	Fractional Rents.	Water-pipe.	Bureau of Water, Department of Public Works.	City Solicitor's Office.	Totals.
1888	$4,158 25	$13,995 04	$1,948 54	$1,793,432 38	$23,584 86	$113,550 16	$133,667 85	$7,742 45	$22,846 97	$2,114,926 50
1887	3,412 75	19,040 87	2,705 79	1,721,488 83	24,453 03	115,939 21	106,602 48	7,287 61	29,504 04	2,030,434 61
Increase	$745 50	.....	.....	$71,943 55	.....	.....	$27,065 37	$454 84	.....	$84,491 89
Decrease	.....	$5,045 83	$757 25	.....	$868 17	$2,389 05	.....	.....	$6,657 07	.....

BY WARDS.

APPLIANCES.	24	25	26	27	28	29	30	31	Total.
Aquaria	.....	.....	.....	.....	.....	1	.....	.....	3
Bakeries	1	4	.....	.....	13	1	.....	.....	29
Barber shops	2	2	1	1	5	.....	2	.....	42
Bars	.....	1	1	.....	1	.....	.....	1	14
Basins and sinks in dwelli	200	15	39	83	909	208	2	5	2,156
Basins and sinks in offices, s hotels, factories, etc	7	14	1	4	24	7	.....	.....	512
Baths in dwellings	500	867	731	239	1538	415	75	102	6,093
Baths in public buildings	.....	.....	.....	.....	.....	3	.....	.....	17
Bidets	.....	.....	.....	.....	2	.....	.....	.....	5
Bottling establishments	1	1	.....	.....	1	1	.....	1	13
Building purposes, numbe	124	204	175	43	284	87	33	9	1,516
Carriages and wagons	.....	1	17	.....	6	.....	.....	.....	33
Cut-offs	37	15	41	18	21	19	44	20	800
Half dwellings	.....	.....	.....	1	.....	.....	.....	.....	21
Drug stores	1	4	.....	.....	5	4	.....	.....	24
Ferrules, number	635	1168	1009	277	2558	343	116	149	9,267
Fountains, counter	1	2	3	.....	1	3	.....	1	34
Fountains, garden	.....	3	.....	1	.....	.....	.....	.....	12
Forges	.....	4	.....	.....	.....	.....	.....	.....	12
Greenhouses	.....	5	2	4	1	.....	.....	.....	35
Hydrants (new buildings)	554	1206	737	274	1758	413	64	116	7,340
Ice cream saloons	2	.....	.....	.....	3	1	.....	1	13
Lawn sprinklers	.....	.....	.....	.....	2	.....	.....	.....	9
Laundries	.....	.....	.....	1	2	3	1	1	20
Machines for scouring, w bleaching, and rinsing,	.....	.....	1	.....	.....	.....	.....	13	87
Milk houses	2	.....	3	.....	2	.....	.....	.....	15

APPENDIX B.

REPORT OF CHIEF CLERK.

Philadelphia, January 31, 1889.

JOHN L. OGDEN,
Chief Engineer.

SIR:—I have the honor to submit herewith a detailed statement of the expenditures of this Bureau for the year 1888.

The recapitulation shows the total amounts available, the subdivisions of expenditures, and the balances remaining to the credit of the Bureau at the close of the year.

Respectfully,

J. T. HICKMAN,
Chief Clerk.

Detailed Expenditures of the Bureau for 1888.

General Appropriation.	Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
An Ordinance to make an appropriation to the Bureau of Water, for the year 1888, approved December 31, 1889	$1,131,588 00			
Increased by transfer from Bureau of Gas $30,000				
Appropriation from surplus 50,000	80,000 00			
	$1,211,588 00			
Diminished by transfer to Department of Public Works $500 00				
To Bureau of Highways 137 55	637 55			
Net appropriation	$1,210,950 45			
Item 1. Salaries	$156,588 00			
Diminished by transfer to Bureau of Highways $137 55				
To Item 7 1,362 45	1,500 00			
Net appropriation to Item 1	155,088 00			
Salary of Chief Engineer	7,000 00	$7,000 00		
" general superintendent	3,500 00	3,500 00		
" assistant engineers	3,200 00	3,200 00		
" draughtsmen	4,000 00	3,616 67		
" chief clerk	2,000 00	2,000 00		
" assistant clerks	1,980 00	1,980 00		
" janitor at main office	675 00	675 00		
" watchman at main office	675 00	675 00		
" lineman	720 00	720 00		
" telephone operators	840 00	840 00		
" foreman of laborers	780 00	780 00		
" watchmen at reservoirs and district yards	15,525 00	14,952 04		
" policemen ($40 each for uniforms	2,860 00	2,818 75		
" river watchman	750 00	750 00		
" general storekeeper	800 00	800 00		
" correspondence clerk	900 00	900 00		
" clerks to general superint'dt	1,750 00	1,750 00		
" search clerk	1,100 00	1,100 00		
" assistant clerks	1,750 00	1,750 00		
" time clerk	900 00	900 00		
" messenger	600 00	600 00		
" pipe inspector	1,200 00	1,200 00		
" purveyors	9,000 00	8,876 67		
" clerks to purveyors	4,320 00	4,320 00		
" general foremen	6,573 00	6,573 00		
" foremen of repairs	3,120 00	3,120 00		
" superintendent of shop	1,500 00	1,500 00		
" clerk to superint'dt of shop	850 00	850 00		

General Appropriation.							Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Item No. 1, continued.										
SALARIES OF EMPLOYEES AT PUMPING STATIONS.	Engineers.	Oilers.	Firemen.	Storekeepers.	Telephone operators.	Coal passers.				
Fairmount	2	4	.....	1	.....	.....	$5,600 00	$5,501 55		
Spring Garden	4	10	20	1	1	6	31,610 00	31,519 11		
Belmont	2	2	4	1	.....	4	10,800 00	9,734 57		
Roxborough	2	1	4	.....	.....	4	8,070 00	7,846 45		
Mt. Airy	2	.....	.....	.....	.....	2	2,970 00	2,970 00		
Chestnut Hill	1	.....	.....	.....	.....	1	1,500 00	1,455 04		
Frankford	1	1	2	.....	.....	.....	3,250 00	3,241 93		
Kensington	.....	2	4	.....	.....	.....	4,620 00	4,620 00		

Detailed Expenditures of the Bureau for 1888.

General Appropriation.	Amount appropria'd.	Amount expended.	Amount merging	Amount not merging
Item 1, continued.				
Salary of				
Foreman Bricklayers	$950 00	$950 00		
" Carpenters	900 00	900 00		
" Painters	900 00	900 00		
" Riggers	900 00	900 00		
" Stonemasons	900 00	900 00		
Electrician	800 00	800 00		
Janitors at Stations	3,600 00	3,286 68		
Totals		$153,272 46	1,815 54	
Item 2. For regular supplies, including fuel, oil, and small stores $125,000 00				
Transferred from Bureau of Gas 20,000 00				
Net appropriation to Item 2	$145,000 00			
Deficiencies of 1887:				
Coal for offices $39 50				
Coal for stations 3,520 02				
Hauling coal 20 10				
Paints 81 44				
		3,661 06		
COAL FOR OFFICES AND DISTRICTS.				
24 tons bituminous, at $6.00. $144 00				
23 tons stove, at $7.50 172 50				
47 tons stove, at $6 50 305 50				
112 tons stove, at $6.00 674 22				
		1,296 22		
COAL FOR STATIONS.				
244½ tons bituminous, Spring Garden, at $3.10 $755 25				
180 tons bituminous, Kensington, at $3.14 565 20				
		1,320 45		
Spring Garden:				
23,484.12, tons pea, at $2.85 $66,931 10				
Belmont:				
8,441.19 tons pea, at $2.85 24,059 55				
Roxborough:				
8,441.05 tons pea, at $2.85 24,057 56				
Chestnut Hill:				
938.14 tons pea, at $3.15 2,956 91				
Frankford:				
3,692.19 tons pea, at $2.95 10,894 21				
Kensington:				
1,535 tons pea, at $2.95 4,528 25				
		133,427 58		
Chandlery		240 81		
Coke		594 30		
Gum goods		22 04		
Hauling coke		156 00		
Hauling coal, Roxborough to Auxiliary, 95 tons, 800 lbs., at 50c $47 67				

Detailed Expenditures of the Bureau for 1888.

General Appropriation.		Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Item 2, continued.					
Chestnut Hill to Mt. Airy, 659 tons, 659 lbs., at 50c.....	385 64				
		.....	383 31		
OILS.					
51½ gals. Black, at 13c	$6 70				
50 " Arctic, at 22c.....	11 00				
51 " Castor, at $1.30....	66 30				
720 " Black, at 9½c.....	68 42				
1463 " Linseed, at 52c.....	76 13				
1407½ " Headlight, at 10c.	140 75				
998 " Engine, at 35c	349 30				
3151¾ " Gasoline, at 15c...	472 70				
1185 " Lard, at 60c.....	711 00				
3610 " Cylinder, at 45c....	1,624 50				
		.....	3,526 80		
Tallow, 1,313 at 5½c.....		.....	72 21		
Towing		.....	20 00		
WOOD.					
28 cords, at $9.95.....		.....	278 60		
Totals.....		.....	$144,999 38	62	
Item 3. For repairs to machinery, including the conveyance of workmen incident thereto.....		$50,000 00			
Deficiencies of 1887:					
Repairs to tube cleaners.....	$12 00				
Wages	$1,223 20				
		.....	$1,235 20		
Babbit metal, 300 lbs., at 22 cents.....		.....	66 00		
Brass castings:					
7,154½ lbs., yellow at 12 cents.....	$858 54				
9,566½ lbs. red metal, at 16 cts..	1,530 64				
	$2,389 18				
Less.					
2,000 lbs. turnings, at 6¼ cents.....	$125 00				
5,500 lbs. turnings, at 5¾ cents.....	316 25				
2,200 lbs. scrap, at 8¼ cents.....	148 00				
	770 75				
		.....	1,618 43		
Brass fittings.....		.....	1,764 80		
Chandlery.....		.....	788 98		
Cylinder head.....		.....	300 00		
Fire brick.....		.....	697 50		
Glass suspension.....		.....	135 00		
Gum goods (valves, etc.).....		.....	3,956 93		
Hardware		.....	17 40		
Hauling.....		.....	300 00		
Iron fittings.....		.....	1,335 74		
Lumber.....		.....	500 00		

Detailed Expenditures of the Bureau for 1888.

General Appropriation.	Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Item 3, continued.				
Machine castings:				
39,852 lbs., at 1 $\frac{88}{100}$ $673 50				
14,414 " 1 $\frac{8}{10}$ 273 87				
18,451 " 3 $\frac{1}{10}$ 572 00				
22,343 " 3 $\frac{1}{4}$ 726 18				
	.....	2,245 50		
Planing valve	.....	140 00		
Repairs to boilers	.....	2,640 62		
" " engine	.....	227 58		
" " hoist	.....	9 71		
" " pipe covering	.....	1,315 92		
" " tube cleaner	.....	20 00		
Steel for shaft	.....	130 98		
Transportation	.....	1,001 10		
Wages:				
Blacksmith	.....	240 00		
Bricklayers	.....	6,553 30		
Carpenters	.....	3,181 25		
Laborers	.....	2,262 03		
Machinists	.....	13,743 86		
Painters	.....	861 00		
Stone masons	.....	297 00		
Totals	.....	$47,585 83	$2,414 17	
Item 4. For maintenance and repairs to buildings, grounds, and reservoirs	$65,000 00			
Deficiencies of 1887:				
Hauling ashes $25 00				
Forage 77 35				
Wages 1,738 00				
	.....	$1,840 35		
Bricks, lime, and cement	.....	1,862 63		
Brass fittings	.....	280 61		
Castings (iron):				
317 lbs. at 1 $\frac{88}{100}$ $6 15				
42,750 " 1 $\frac{88}{100}$ 722 47				
53,978 " 3 $\frac{1}{10}$ 1,689 86				
	.....	2,418 48		
Chandlery	.....	1,338 26		
Cleaning cess pool	.....	25 00		
Electric supplies	.....	519 29		
Forage	.....	885 63		
Freight	.....	1 23		
Gum goods	.....	1,059 46		
Hardware	.....	2,363 54		
Hauling ashes, Frankford $120 00				
" " Kensington 272 58				
" " Roxborough ... 474 00				
	.....	866 58		
Horse shoeing	.....	74 60		
Ice	.....	249 24		
Lumber	.....	4,743 14		
Moving safes	.....	40 00		
Paints, etc.	.....	2,277 30		
Professional services, V. S.	.....	20 00		

Detailed Expenditures of the Bureau for 1888.

General Appropriation.		Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Item 4, continued.					
Repairs to carts	$32 10				
" electric machines	225 00				
" gas machines	3 90				
" harness	59 50				
" heater	2 50				
" lamps	12 28				
" roofs	795 51				
" tracks	19 52				
		.....	$1,150 31		
Regulating curb		.....	16 64		
Scales		.....	1,329 20		
Stone (building)		.....	119 00		
Stone wall		.....	368 86		
Telephone, rental		.....	949 50		
" supplies		.....	105 47		
Window glass		.....	29 68		
" shades		.....	55 00		
Wages, Blacksmiths		.....	75 00		
" Bricklayers		.....	183 60		
" Carpenters		.....	4,944 50		
" Horses, carts, and drivers		.....	1,406 25		
" Laborers		.....	22,226 94		
" Painters		.....	7,038 00		
" Stone-masons		.....	1,585 50		
Totals		.....	$62,448 79	$2,551 21	
Item 5. For maintenance and improvement of the distribution, including the purchase of material and cost of labor in connection therewith, and expenses incident thereto	$ 170,000 00				
Transferred from Bureau of Gas, December 24	10,000 00				
Net appropriation to Item 5		$180,000 00			
Deficiencies of 1887:					
Coke	$28 85				
Dynamite	34 00				
Gum goods	20 95				
Hauling	308 75				
Iron pipe	560 28				
Lumber	158 95				
Measuring over pipe	133 40				
Repairs to pavement	244 32				
Wages	5,994 07				
		.....	7,433 52		
Brass fittings		.....	331 53		
Bricks, lime, and cement		.....	243 02		
Chandlery		.....	767 39		
Coke		.....	194 45		
Corporation cocks:					
9,088—½-inch, at 57c	$5,180 32				
500—⅝-inch, at 62c	310 00				
400—¾-inch, at 80c	320 00				
200—1-inch, at $1.15	230 00				
25—1½-inch, at 2.75	68 75				
100—2-inch, at 4.25	425 07				
		.....	6,534 07		

Detailed Expenditures of the Bureau for 1888.

General Appropriation.	Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Item 5, continued.				
Drills		29 00		
Freight		4 61		
Frost valves, 224 at 60c		134 40		
Gum goods		460 35		
Hardware		742 98		
Hauling		4,157 79		
Iron fittings		217 93		
Iron pipe:				
130, 4-in., 28,671 lbs., at .01 33/100, $381 33				
8785, 6 " 3,199,506 " at .01 315/1000, 42,105 48				
200, 12 " 184,483 " at .01 283/1000, 2,326 32				
Breeches pipe, 5,010 lbs. at .03 73/100, 186 87				
		45,000 00		
Iron specials, 548,302 lbs., at .02 3/8		13,022 20		
Lumber		2,711 62		
Measuring over pipe		1,188 90		
Plumbing		5 50		
Powder (blasting)		247 01		
Putting in glass		7 50		
Repairs to meters		72 00		
Repairs to pump		5 00		
Sawdust		15 00		
Services of diver		192 00		
Sharpening tools		64 28		
Stop valves:				
15—6-inch—3 way, at $25.50...$382 50				
10—6-inch—4 way, at $72.50... 722 50				
5—6-inch—5 way, at $74.25... 373 75				
		1,478 75		
Stone		354 62		
Suction pump		51 10		
Supporting tracks		349 60		
Tallow		2 75		
Testing screws		20 50		
Testing machine		600 00		
Transportation		25 00		
Traveling expenses		287 24		
Wharfage		33 60		
White metal		295 00		
Wages, First District		11,254 48		
" Second District		12,674 98		
" Third District		18,292 19		
" Fourth District		25,638 07		
" Fifth District		5,114 58		
" Sixth District		9,494 02		
" Improvement to distribution		9,858 25		
Totals		$179,656 78	$343 22	
Item 6. For supplies, including fuel and labor at the city repair shop	$50,000 00			
Deficiencies of 1887:				
Shop castings		$317 88		
Brass castings, 4,864 1/2 lbs. (yellow), at 12c...$583 70				
Brass cast'gs, 5,619 1/2 lbs. (red metal), at 16c... 899 12				
		1,482 82		
Brass fittings		156 56		
Chandlery		215 93		

Detailed Expenditures of the Bureau for 1888.

Special Appropriation.	Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Coal for shop:				
32 tons bituminous, at $6.00, $192 00				
251⅓ tons nut, at $6.00 ..... 1,508 00				
	.....	1,700 00		
Corporation cocks, 312, ½ inch, at 57c.	.....	177 84		
Frost valves, 276, at 60c.	.....	165 60		
Galvanizing	.....	245 32		
Gum goods	.....	46 49		
Gum valves	.....	2,950 00		
Grinders	.....	18 50		
Hardware	.....	1,703 88		
Iron castings:				
117,870 lbs., at .01 $\frac{88}{100}$ $1,992 01				
22,696 lbs., at .01 $\frac{9}{10}$ 431 23				
204,999 lbs., at .01 $\frac{38}{100}$ 3,997 51				
284,756 lbs., at .03¼ 9,254 58				
	.....	15,675 33		
Iron and steel	.....	$1,445 45		
Lumber	.....	800 00		
Stone sills	.....	40 00		
Turning and facing	.....	36 70		
Wages	.....	21,879 37		
Totals	.....	$49,057 67	942 33	
Item 7. For general incidental contingent expenses, including six hundred and fifty (650) dollars for keep of horse for Chief Engineer, and seven hundred and fifty (750) dollars for keep of horse for General Superintendent and Assistant Engineer $15,000 00				
Increased by transfer from Item 1 ..... 1,362 45				
$16,362 45				
Diminished by transfer to Department of Public Works $500 00				
Net appropriation to Item 7	$15,862 45			
Deficiencies of 1887:				
Hardware 11 37				
Incidentals 48 12				
Subscriptions 5 50				
Wages 372 00				
	.....	436 99		
Advertising	.....	222 00		
Analysis of water	.....	150 00		
Books of Germantown Water Co	.....	500 00		
Carriage hire	.....	81 00		
Desks, chairs, etc	.....	916 00		
Ground rent 918 Cherry street	.....	26 66		
Gum goods	.....	4 67		
Incidentals	.....	751 97		
" hydrostatics	.....	153 26		

Detailed Expenditures of the Bureau for 1888.

General Appropriation.	Amount appropria'd.	Amount expended	Amount merging.	Amount not merging
Item 7, continued.				
Keep of horse:				
Chief Engineer..... $650 00				
General Supt. and Assistant Engineer..... ..... 750 00				
	.....	1,400 00		
Maps.....	.....	415 50		
Rent of shop.....	.....	100 00		
Subscriptions.....	.....	9 50		
Stationery, postage stamps, etc.....	.....	5,232 50		
Transportation	.....	1,014 65		
Traveling expenses (pipe Inspectors)..	.....	22 02		
Telephone rental.....	.....	317 00		
Wages, contingent..... $2,094 00				
" hydrostatic..... 1,488 00				
	.....	3,582 00		
Washing towels.....	.....	84 00		
Totals.....	.....	$15,419 72	442 73	
Item 8. For extensions.....	$500,000 00			
Asphalt pavement	.....	$16,444 10		
Brass castings:				
1963½ lbs., at 12c..... $235 60				
4777½ lbs., at 16c 764 40				
	.....	1,000 00		
Bricks, lime and cement.....	.....	2,163 37		
Brick pavement.....	....	1,305 53		
Chandlery.....	.....	200 00		
Clay, 120,897 loads, at 24c.....	.....	29,015 28		
Granite curb.....	.....	603 47		
Granite curb and Belgian paving.....	.....	5,500 20		
Gum goods.....	.....	247 13		
Hardware	.....	659 12		
Hauling.....	.....	2,181 03		
Horses, carts and drivers.....	.....	38,653 88		
Iron fittings.....	.....	1,024 25		
Iron pipe:				
410 16-inch, 546,890 lbs., at .01 $\frac{235}{1000}$..... $6,775 97				
164 48-inch, 1,341,106 lbs., at .01 $\frac{15}{100}$ 15,422 72				
	.....	22,198 69		
Iron specials, 109,834 lbs., at .02 $\frac{35}{100}$.....	.....	2,780 08		
Iron castings for shop:				
1,900 lbs., at .01 $\frac{85}{100}$..... $321 10				
59,886 " .01 $\frac{95}{100}$..... 1,167 78				
79,476½ " .03 $\frac{1}{10}$..... 2,463 79				
46,490 " .03 $\frac{1}{4}$..... 1,510 92				
	.....	$5,463 59		
Incidentals.....	.....	278 83		
Iron and steel.....	....	1,528 06		
Lining northeast section, East Park Reservoir;				
29,710 sq. yards, brick, at $1.12..... $33,275 20				
172,044 sq. yards, concrete at $1.12..... 192,689 28				
	.....	225,964 48		
Lumber	.....	3,000 00		
Lead (pig), 104,530 lbs. at .05 $\frac{75}{100}$.....	.....	6,000 00		
Stack, Roxborough Station.....	.....	2,621 00		
Stop valves.....	.....	361 25		

Detailed Expenditures of the Bureau for 1888.

General Appropriation.	Amount appropria'd.	Amount expended.	Amount merging.	Amount not merging
Item 8, continued.				
Stone		172 50		
Supporting tracks		355 51		
Wages:				
Electric Bureau		78 24		
First District		5,809 36		
Second "		755 75		
Fourth "		4,986 99		
Sixth "		790 31		
Shop		5,575 66		
Plough teams, East Park Reservoir		3,300 50		
East Park Reservoir		100,117 85		
Totals		$491,131 01	$4,106 38	$4,762 61
Item 9. For new mains in front of new houses, appropriation July 2, 1888	$50,000 00			
Brass castings:				
1,672 lbs., at 12c. $200 64				
4,996 " 16c. 799 36				
		$1,000 00		
Iron pipe:				
270 4-inch, 60,731 lbs. at .01 33/100 $807 73				
2,214 6-inch, 807,637 lbs. at .01 313/1000 10,628 49				
50 8-inch, 24,363 lbs. at .01 313/1000 319 64				
25 10-inch, 16,721 lbs. at .01 472/1000 212 69				
		11,968 55		
Iron breeches pipe, at .03 47/100		881 21		
Lead (pig), 200,757 lbs. at .05 74/100		11,523 44		
Powder (blasting)		56 25		
Wharfage		56 85		
Wages:				
First District		252 00		
Second "		3,617 12		
Third "		4,214 78		
Fourth "		6,094 38		
Fifth "		2,017 82		
Sixth "		5,350 96		
Totals		$47,033 36	$2,966 64	
Item 4. Appropriation of 1887:				
Balance, January 1, 1888	3,302 40			
Retaining wall, Fairhill Basin		$3,302 40		
For maintenance and repairs to buildings, grounds, and reservoirs transferred from surplus Gas Loan, No. 9, November 12, 1887.				
Balance, January 1, 1888	13 70		13 70	
FOR THE EXTENSION OF WORKS.				
Appropriation from surplus of Gas Loan, No. 9, Ordinance, May 18, 1886.				
Balance, January 1, 1888	13,826 87		26 87	$13,800 00

Detailed Expenditures of the Bureau for 1888.

RECAPITULATION.			
Available for 1888.			
Balance from books of 1887		$17,142 97	
Transferred from other Bureaus	$80,000 00		
Transferred to other Bureaus	637 55	79,362 45	
Annual appropriation		$1,131,588 00	$1,228,093 42
Expended from annual appropriation:			
Deficiencies	$14,975		
Extensions	491,131 01		
Maintenance	684,498 99		
		$1,190,605 00	
Expended from balance for extensions		3,302 40	
Total expenditure		$1,193,907 40	
Amount merging	$15,623 41		
Amount not merging	18,562 61		
		34,186 02	
			1,228,093 42

APPENDIX C.

REPORT

OF THE

GENERAL SUPERINTENDENT

OF

WORK DONE DURING 1888 TO BUILDINGS, GROUNDS AND RESERVOIRS, AND BOILERS AND MACHINERY OF THE SEVERAL PUMPING STATIONS.

OFFICE OF THE GENERAL SUPERINTENDENT,

BUREAU OF WATER.

January 31, 1889.

JOHN L. OGDEN,
Chief Engineer.

SIR:—The following report of work performed under my direction for the year 1888 is herewith submitted.

Respectfully,
F. L. HAND,
General Superintendent.

FAIRMOUNT.

BUILDINGS AND GROUNDS.

The carpenter shop, offices and houses, and over wheel houses repaired and painted with cement paint; the entire rail from Callowhill street to the end of mound dam painted and sanded; roof over mansion repaired; new pavement in-

side of fountain; dressed curb set and asphalt pavement laid on east side of basin, on Twenty-fifth street, from Spring Garden to Green street entrance of park; the inside slopes of the basin repaired on the south and east sides; bridges over stops rebuilt, and stop-houses repaired; the inclines and outside banks kept clean and grass mowed; the old dead trees were cut down, the stumps removed, the wood sawed up and hauled to the storage yard at the Spring Garden station; the fence around the lower terrace was found to be rotten and torn down; new flash boards put up the entire length of the dam and kept in repair; the cellar under the mansion torn out; the old pump-well filled up and drain-pipe laid, and the walls whitewashed; the grounds around meter shop graded and paved; the pumping mains over forebay painted; ladies toilet room in mansion painted and grained.

The iron fence on incline painted; steps and gutters repaired; roof over lower wheel-house calked and the seams filled with white lead; two boats built for use at East Park reservoir; the entire wheel-house whitewashed and kept in good condition.

MACHINERY.

Turbine No. 1.—New lugs on head gate; tail gate repaired, pump valves examined, and all lost motion taken up; steps under upright shaft raised; floor of flume and guide-wheel repaired.

Turbine No. 3.—One new set of pump-valves put in on north pump. New disc clamped on upright shaft; enlarging the wearing surface of the step from 15-inch to 18-inch; the spur and bevel wheel repaired; cogs rekeyed; new lugs put on head gates; new step and water-pipes.

Turbine No. 4.—Fitted with Geyelin's glass suspended step; braces put in side of wheel casing to take weight of wheels; cogs repaired and rekeyed.

Turbine No. 5.—Lined up; valves repaired and plungers examined.

Turbine No. 7.—One new valve seat of brass put in; step repaired; cogs repaired and rekeyed, and lost motion taken up.

Turbine No. 8.—Bevel wheel entirely recogged and new keys fitted; valves examined; step repaired and cogs in spur-wheel dressed up.

Turbine No. 9.—The old cornish valves taken out and both sides fitted with brass valve seats, with four-inch rubber valves, 180 in all; the spur-wheel was recogged; new steps under upright shaft and the shaft lined up.

New heater-pipes run, and water-pipes to all the steps examined and repaired; boilers for heating station cleaned and painted; screens to Turbines frequently cleaned.

SPRING GARDEN—(Old Station).

The entire outside of engine and boiler-house painted with two coats; the coal shed and track was raised thirty-inches, increasing the capacity of the bins three hundred tons; the old scales were taken out, and a new Fairbank's 34 feet track scales put in, all enclosed under shed; the siding to main track was raised; new ties put down; wall raised on side of track and grounds graded; stone piers built to support the scales and track; the second-story of the store house was fitted up for carpenter shop; sky-lights put in roof, and steam-pipes for heating put in; a fence was built from wagon shed to store house; the machine shop floor was torn out and new joist and floor laid; the roof on the boiler and engine house repaired; new tin roof over firemen's dressing room; doors put up between new boilers and No. 11 engine; a retaining wall was built in front of No. 7 and 8 engine-house, and finished with coping and pointed; a wall was rebuilt on the south side of drive at No. 8 engine-room; the entire roadway from east door of old engine-house to river drive was set with dressed curb and paved with Belgian blocks; inlets were made and drains laid to properly drain the grounds; the ash pit on the north side of forebay was graded, paved, drained and the

walls raised; a green-house was built on south side of No. 8 engine-house; a scaffold was built around the stack of No. 6 boilers and the stack repaired and painted; platforms were built over new boilers, and the sash in boiler and engine-house repaired; the engine and boiler rooms whitewashed; cellars cleaned and whitewashed; the screens to all the pumps kept clean; the floor of cellar of No. 6 engine room cemented; office in store-house plastered; new float made in forebay for cleaning screens; grounds behind coal shed graded and drains put in; all drains and inlets cleaned and grounds kept in good condition.

OLD STATION MACHINERY.

Engine No. 6.—Plungers packed; wells cleaned; steam pipes altered, and all lost motion taken up.

Engine No. 7.—The beams raised and boxes taken out and refilled with Babbitt metal; the journals trued up and beams put in line; the fly-wheel shaft was jacked up and main pedestal boxes taken out, shaft trued up and boxes refilled, new liners put in, both cylinder heads taken off and packing set out, valves re-set, pump plungers tightened, and valve seats refastened; air pumps examined, relief valves repaired and ground in; suction and force injection examined and new joints made on them.

Engine No. 8.—The high and low pressure cylinder heads taken off, piston rings set out, tail rods taken off, holes through cylinder heads plugged up; new joints made to jacket pipes, new valves and studs in air pumps; steam valves reset, pump valves examined, lagging around cylinders, and valve chests cleaned and polished, and wells and screens cleaned out.

Engine No. 11.—Cylinder heads taken off of left hand side and packing set out; air pump valves renewed; charging pipes put on $3\frac{1}{2}$ inch in diameter; all journals taken apart and dressed up, extensions made to the cut-off with wheels to be operated from engine room floor; the force injection made to be operated from the upper gallery; new Mason steam trap put

Total Capacity,

1888.	
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	
Totals and averages.	

on; well pumped out and cleaned; pump valves frequently examined and repaired.

The steam pipes were all taken down and altered, new joints made and stops put in, and so arranged that each set can be used for either engine.

Donkey pumps kept in order and all steam feed and blow-off pipes attended to and kept in order.

BOILERS.

Boilers from 7 to 11, inclusive.—Cleaned fronts painted, furnaces relined, and all safety valves examined and ground in; all feed and blow-off pipes attended to; water and steam gauges and gauge cocks kept in order.

Boilers 12 to 16, inclusive.—Cleaned, scaled, furnaces relined, grate bars reset, and all valves, pipes, and gauges attended to.

Boilers 17 to 21, inclusive, also No. 14.—The tubes were taken out, cleaned, safe-ended and replaced; furnaces relined and fitted with Tupper grate bars; heater pipes repaired, boilers thoroughly cleaned while the tubes were out, and all valves, pipes, water-gauges, and gauge-cocks examined and kept in repair.

Boilers 34 to 38, inclusive.—Boilers scaled and cleaned, fronts painted, and connections kept in perfect condition.

SPRING GARDEN—(New Station).

BUILDINGS AND GROUNDS.

Asphalt walks laid in front of works around grass plots, and on south side of engine-house to ash pit; flower beds laid out and large urn put on west side of drive; fence put up along river wall; ash pit graded and drain put in, and wall raised around it; a gate was fitted in the conduit to No. 9 and 10 engine; the pump wells pumped out, new sills put under screens, and new screens fitted; the wells cleaned out and

Total capacity 30,000,000 gallons per day.

NEW SPRING GARDEN PUMPING STATION.

No. 9, Worthington Duplex.—Capacity 15,000,000 gallons per day.
No. 10, Worthington Duplex.—Capacity 15,000,000 gallons per day.

1888.	Running Time of each Engine in Hours.		Gallons Pumped by each Engine.		Total Pumpage of each Month.	Average Pumpage per Day.	Coal.		Percentage of Ashes.	Oil.		Mean Water Pressure and Mean Suction Lift in lbs. per sq. in.		Gallons raised 100 feet per pound of coal.
										Cylinder.	Engine.			
	No. 9.	No. 10.	No. 9.	No. 10.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 9.	No. 10.	
January	333	352	174,412,467	178,713,672	353,126,139	11,391,130	742	99	19	210	34	74	74	338.8
February	174¾	261	102,128,517	147,466,827	249,595,344	8,606,736	475	176	19	217	37	70	73	374.0
March	356	668	162,770,504	341,036,433	508,806,937	16,413,127	986	748	19	366½	62	79	79	367.3
April	711½	720	339,732,883	344,109,447	683,842,330	22,794,744	1,301	1,554	20	386	60	80	80	374.7
May	482¼	619¾	253,966,862	339,298,927	593,265,789	19,137,606	1,132	1,321	24	338	62	79	79	373.0
June	720	408	432,020,859	234,205,045	666,225,904	22,274,196	1,146	987	20	261	62	78	78	413.7
July	737¼	737½	412,928,477	414,544,879	827,473,356	26,692,688	1,373	1,175	20	354	63	78	78	428.9
August	743	744	428,915,799	426,250,599	855,166,398	27,586,012	1,427	1,585	19	329	63	77	77	428.6
September	616½	573¼	357,864,843	330,991,529	688,856,372	22,961,879	1,148	1,320	20	301	60	76	76	427.4
October	744	743½	391,522,504	395,657,854	787,180,358	25,392,914	1,391	2,220	19	350	62	78	78	402.6
November	712	716	383,812,216	388,345,359	772,157,575	25,738,585	1,340	1,793	20	331	60	76	77	410.0
December	403¾	741¼	203,635,535	388,305,679	591,941,214	19,094,877	1,127	548	20	321½	57	79	78	373.0
Totals and averages	6,734	7,284¼	3,643,711,466	3,928,926,250	7,572,637,716	20,690,266	13,594	91	20	3,760	682	77	77	396.6

white-washed, cellar and fire room white-washed, roof painted, engine-house roof repaired, and rain conductors renewed; the grounds in front of engine-house laid out in flower beds, and kept in good condition; a new iron fence put over gates at river front; urns in front of works painted and filled with plants.

ENGINES.

Engine No. 9.—Heads of high and low pressure cylinders removed, springs set out; in low pressure, pistons were put in; all valve seats in air pumps refastened and larger studs put in; valve seats in pumps refastened, twenty new seats put in; new valve stem on right hand side; new pins in bell crank; lagging repaired; pits and wells cleaned out, and pumps cleaned, painted, striped, and varnished.

Engine No. 10. High and low pressure cylinder head removed, pistons set up and packing rings set out. Air pumps examined, valve seats refastened and new studs put in; pump valves examined and fastened, pumps painted, striped and varnished. Donkey pumps and electric engines kept in good condition by frequent examinations and repairs.

BOILERS.

Marine Boilers Nos. 22 to 27 and 30 to 33 all inclusive, cleaned and scaled; bridge walls rebuilt; all safety stop, blow-off and check valves kept in good, working order; all glass gauges and gauge cocks attended to. New joints made on steam and blow-off pipes. Coverings of boilers and steam pipes repaired.

EAST PARK RESERVOIR.

During the year the northeast division of the reservoir was completed. In February and March the Engineer corps made surveys of this section, estimated the amount of gravel to be removed, clay required, and square yards of concrete and brickwork to be laid.

Clay, to the right elevation had been placed on $\frac{1}{5}$ of the bottom, also on the north, south and part of the east slope, but slopes were badly washed, making a deposit at the foot, from three to five feet deep, and extending into bottom from 125 to 150 feet. On April 2 a gang of workmen were started. A drain pipe through Montgomery street stop-house was cleaned out. A growth of brush, sod, etc., was grubbed from slopes, preparatory to puddling them to their original pitch. The slopes were carried up in steps 18 inches wide, in layers of two to three inches deep, well rammed, and afterwards dressed to a smooth and true grade. To replace clay on south bank, a derrick and three platforms were erected; tracks laid at foot of slope: trucks with detached boxes were filled with clay, washed from slope, hoisted by derrick and dumped into carts which hauled to place required.

Four gangways, 300 feet long and 18 feet wide were erected. The first, near the middle of west embankment, the second on inside of basin, at northeast corner, the third and fourth opposite each other inside, and outside at middle of east embankment. Adjoining the latter gangways the contractor put up a stone-crusher. A three inch water pipe was laid along the greater portion of the western bank, and part of the southern connections were made with pipe on Thirty-third street, and laid through both stop-houses, another ever embankment to foot of slope. Finally, a three-inch pipe was laid from south basin two-thirds of the way diagonally across bottom.

The east embankment, 300 feet each side of Norris street stop-house was built from natural surface to the proper height Rubbish was removed from base of stop-house, and a puddle, four feet wide was thoroughly rammed up, the fill around stop-house being 32 feet, and the rest from 16 to 18 feet.

The west embankment was built up, from three to five feet, its entire length. From an area of ground 250 feet long, 200 feet wide and 6 feet deep, the top soil was removed; $2\frac{1}{2}$ feet of clay was used on bottom, the remainder being gravel, was

hauled out. A runway of clay, containing 1600 cubic yards, and clay washed from slopes, was spread on bottom. A runway at east embankment, contained 5500 cubic yards and an average of 18 inches of gravel on bottom, that had not been puddled, was mostly used in building embankments, and filling up space on Thirty-third street, from which clay was taken for basin. The clay was put on bottom in three layers 6 inches deep; each layer was well puddled, then dressed, and rolled to proper grade. The total number of loads of clay brought from outside was 123,984, and 60,000 cubic yards of gravel were hauled out.

The bottom and slopes were lined by contract; the slope begun May 1st were lined with straight, hard paving brick, laid on edge on cement mortar two inches thick; the bottom was begun June 5th, and lined with 4½ inches of concrete, composed of one part of the best Portland cement to two of bar sand and four of stone, broken to pass through 1½ inch ring; the cement and sand were thoroughly mixed first; afterwards the stone was well mixed with the mortar, and spread evenly on the bottom, well rammed and covered with ½ inch of mortar; on top of this a dryer was used, composed of equal parts of cement and dry sand, then floated and troweled to a smooth and dry surface; the top of embankment was graded four inches below the top edge of brick curbing, and an average of 16 feet wide for a vulcanite pavement, done by contract, from west division bank around southeast and north sides of reservoir to west division bank, also division embankment between north and southeast basins, a distance of 4,764 feet; for this pavement 990 cubic yards of clean sharp gravel was excavated from bottom of basin, and distributed where required, all the above contracts were completed October 19th.

A brick curbing, 5,231 feet in length, was laid in cement mortar on top of slope; a fence of yellow pine was placed on top of embankment, on the east and north sides, and painted. On the west bank a temporary fence was put up, and three

man-holes to the stop chambers were built up, and iron covers placed on them; a portion of the brick facing was rebuilt, also stone grooves for screens were repaired on Norris street stop house; in both the Montgomery and Norris street stop-houses the bottom of chambers were cleaned out and repaired with cement mortar; the walls were repointed, the wing walls were repaired, pointed, and covered with cast-iron plates; the buttresses covered with cement coping; the tops set with beams two feet apart, and brackets for gate hoists and grates were placed on them; six gates were set on Montgomery street and four on Norris street stop-house; rods were put in to operate them from the top; in Montgomery street stop-house bulk-heads were taken out between connecting chambers; screens were piaced in front of inside gates; six stops were put in drain pipe; rods to work them from the top were attached to four of them; office and tool house were removed from the top of Montgomery street stop-house, and part of stone coping set on it.

Five brick piers supporting the pipes connecting the other basins and brick casing over drain pipe through north embankment were repaired, pipes cleaned out, and stops put in working eondition; three gauges were made and placed in basins; two roadways of gravel, 100 feet long, 18 feet wide, were made on outer slope at northeast corner; 800 feet of the outside slope of the east embankment was dressed down 1½ to 1, covered with six inches of top soil and seeded; a border 18 inches wide outside of vulcanite pavement was sodded from west division bank around south and part of east embankment.

DIMENSIONS.

Area of bottom	172,044 square yards.
Area of slopes	29,710 square yards.
Elevation of bottom	108.375 C. D.
Elevation of water line	133.4 C. D.
Elevation top of embankment	137.385 C. D.
Distance around top of slope	5,231 feet.
Distance around foot of slope	4,975 feet.
Capacity	306,869,805 gallons.
Pavement laid	8,900 square yards.

CORINTHIAN AVENUE BASIN.

Slopes repaired on south side; banks on Parrish street side sodded; inclines gravelled and trees trimmed. The entire banks kept mowed; pavements repaired and boat rebuilt.

SPRING GARDEN BASIN.

The basin frequently cleaned of growing grass; south slope repaired. The grounds around the bottom cleaned up and graded. The outside banks built up; stop houses repaired; an iron fence was put up on Thompson street to corner line of property, then to the back of machine shop on Twenty-seventh street; also, on Master street from property line to bath house. Ingersoll and Seybert streets were shut off with an iron fence, and all alleys and gates boarded up, totally enclosing the grounds, excepting through the gates, two of which are on Thompson street. Coal boxes built and painted.

BELMONT.

BUILDINGS AND GROUNDS.

The engine-house painted inside and out with two coats of paint, and the inside work varnished; all the hard wood scraped and varnished; the roof of engine-house repaired, and cornice painted; new rain conductors put up; new curtains fitted to all the windows; pump wells cleaned out and cellar white-washed; a scaffold was built around old stack and the stack found to be badly cracked; four wrought iron braces were put on with logs and bolts to screw them up, and lightning-rod put up; the stack was then pointed and painted; the boiler-house was white-washed and roof repaired; the grounds around the works graded, sodded and flower beds made; side tracks repaired and bridge over stream at siding repaired; coal shed repaired and north end fitted up as storage room; the grounds back of coal shed cleaned and the place kept in good condition.

Total Capacity—18,000,000 gallons per day.

BELMONT PUMPING STATION.

No. 1.—Worthington Duplex.—Capacity, 5,000,000 gallons per day.
No. 2.—Worthington Duplex.—Capacity, 5,000,000 gallons per day.
No. 3.—Worthington Duplex.—Capacity, 8,000,000 gallons per day.

1888.	Running Time of each Engine in Hours.			Gallons Pumped by each Engine.			Total Pumpage of each Month.	Average Pumpage per Day.	Coal.		Percentage of Ashes.	Oil.		Mean Water Pressure and Mean Suction Lift in Pounds per Square inch.			Gallons raised 100 feet per pound of coal.
												Cylinder.	Engine.				
	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	No. 3.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 1.	No. 2.	No. 3.	
January	254½	370½	315	58,075,500	91,300,560	117,188,610	266,564,670	8,598,860	596	2,200	18	85	20	88	88	88	430.9
February	66½	.....	625¾	14,550,600	.....	235,450,525	250,001,125	8,620,728	267	2,190	19	62½	15	88	.....	88	471.5
March	477¾	563	84¾	108,603,600	137,132,424	31,623,940	277,359,964	8,947,095	673	1,330	19	81¼	24½	88	88	88	397.4
April	443½	645	.....	103,516,200	162,303,648	.....	265,819,848	8,860,661	657	1,135	19	86¾	23¾	88	88	.....	390.2
May	233	449	299	56,683,800	116,547,600	114,728,205	287,959,605	9,289,019	586	334	20	80¼	26¼	88	88	88	474.1
June	318	133	597¼	75,589,800	33,739,680	231,691,290	341,020,770	11,367,359	747	1,000	19	89	28¼	88	88	88	440.5
July	263	376	493½	61,485,300	93,812,472	189,634,030	344,931,802	11,126,832	736	1,318	19	100	26¾	88	88	88	451.9
August	30	316	695¾	7,140,300	78,891,384	265,001,090	351,032,774	11,323,637	753	2,055	19	93½	30	88	88	88	449.3
September	425	553½	254¾	100,559,400	137,652,528	101,199,130	339,411,058	11,313,701	759	625	19	102¼	26¾	88	88	88	431.4
October	283	422½	428½	65,028,600	103,321,920	166,475,280	334,825,800	10,800,832	703	585	20	99¼	26¼	88	88	88	453.1
November	245½	221½	526½	55,749,900	52,134,264	199,126,450	307,010,614	10,233,687	677	753	19	89	23¼	88	88	88	437.4
December	375¾	404¾	311	80,382,600	103,588,056	119,049,555	303,020,211	9,774,845	718	795	20	83¼	22¾	88	88	88	407.1
Totals and averages	3,416¼	4,454¾	4,631¾	787,965,600	1,110,424,536	1,771,168,105	3,668,958,241	10,024,476	7,878 Soft coal. 243	880 coal. 1,653	19	1,052	293½	88	88	88	431.8

MACHINERY.

Engine No. 1—Air-pumps all repaired with new studs and valves; new pins in bell crank; foundation bolts renewed; cylinder heads taken off and packing rings set out; all pump-valves examined and renewed where required.

Engine No. 2.—The low pressure pistons were fitted with elliptic springs for setting out the packing; air-pumps examined and new studs and valves put in; the pump valves examined and renewed when found worn.

Engine No. 3.—New plunger rod put in east pump; new head on plunger of west pump; new cylinder head put on right hand cylinder, the old one being broken by the breaking of the pump-rod; the pistons fitted with elliptic springs and blocks to take the weight of pistons; air-pums examined, new studs and valves put in; pump valves renewed as required; Nos. 1, 2 and 3 pumps cleaned, painted, striped and varnished.

BOILERS.

Cylinder boilers were cleaned; furnaces relined; fronts painted; all joints kept in repair, and gauges kept in order

Boilers Nos. 9 to 15, inclusive.—Furnaces relined; bridge walls rebuilt; boilers scaled and cleaned; fronts painted; new joints made on steam-pipes; safety valves ground; blow-off-pipes renewed; water glasses and gauge-cocks cleaned.

BELMONT.

BASIN.

The inside slopes repaired and kept weeded; the outside banks frequently mowed; the walk on top cleaned and graded; new well dug and closet built over it, and the old well filled up; watch-house and boat repaired; new steps put in, and new water-gauge put up.

ROXBOROUGH.

BUILDINGS AND GROUNDS.

A new brick stack was built on the north side of fire-room. The work was done by contract from plans furnished by the Bureau of Water. The dimensions are 100 feet high and 5 feet internal diameter, built by masonry to the height of 28 feet, laid with stone in cement mortar, composed of two parts sand and one part Portland cement; joints pointed and painted. The brick work is of straight, hard brick, laid in mortar of one part of Portland cement, two parts of lime and six parts of bar sand. The top of stack is covered with a cast-iron cornice bolted together. The wooden cornice was put around to conform with the cornice of the engine and boiler-house. The work was constantly under the supervision of an employé of the Bureau of Water.

The old stack was taken down and the marine boilers are being moved to connect with the new stack; a new office was built for use of the engineers; floors repaired; roof of engine and boiler-house repaired; boiler-house and coal-shed white-washed; grounds cleaned and kept in order; steam-pipe run to engineers' houses and heaters put in them.

MACHINERY.

Engine No. 2.—Cylinder heads taken off; piston examined and packing set out; air-pumps heads raised and the piston valves and studs put in good condition; the pump-valves examined and renewed as required; joints made on steam-pipe; lagging around cylinder repaired.

Engine No. 3.—Two new plunger rods put in, one in each pump, to replace broken ones; piston packing set out; air-pumps examined and repaired; also, pump valves; lagging repaired and joints made on steam pipes; wells and screens cleaned.

A 30-inch stop was put in pumping main outside of engine-house; the check valve altered and ready to put in place;

Total Capacity, 14,750,000 gallons. per day.

ROXBOROUGH PUMPING STATION

No. 1.—Cornish Overhead Beam.—Capacity, 2,250,000 galls. per day.
No. 2.—Worthington Duplex.—Capacity, 5,000,000 gallons per day.
No. 3.—Worthington Duplex.—Capacity, 7,500,000 gallons per day.

1888.	Running Time of each Engine in Hours.		Gallons Pumped by each Engine.		Total Pumpage of each Month.	Average Pumpage per day.	Coal.		Percentage of Ashes.	Oil.		Mean Water Pressure and Mean Suction Lift in lbs. per sq. inch.		Gallons raised 100 feet per pound of coal.
										Cylinder.	Engine.			
	No. 2.	No. 3.	No 2.	No. 3.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 2.	No. 3.	
January	444	173	112,649,585	49,652 499	162,302,084	5,235,551	634	950	25	200	53	157	157	422 1
February	441	209	114,480,355	59,218,113	173,698,468	5,989,602	678	1,851	25	214	48	158	159	422.4
March	560	107	137,505,400	30,532,368	168,037,768	5,420,573	666	1,357	25	212½	36½	158	159	415.9
April	538	140½	129,821,830	42,735,369	172,557,199	5,751,906	645	1,323	25	224½	34½	163	157	434.0
May	611	111	150,388,345	31,150,923	181,539,268	5,856,105	699	243	24	236	44¼	162	159	431.2
June	88½	698½	19,552,010	212.538,786	232,090,796	7,736,359	835	1,912	25	278½	46	154	158	458.1
July	48	677	12 936.920	199,391 718	212,328,648	6,849,311	793	1,821	25	223	32¼	160	160	441.3
August	52½	691½	13,46 .,440	211,456,623	224,918,063	7,255,421	845	2,129	25	214	32	162	160	438.6
September	104	610	26,652,070	184,504,476	211,156,546	7,038,551	773	1,262	25	194½	39	161	160	450.4
October	86	639	22,452,155	201,632,901	224,085,056	7,228,550	775	1,378	25	176½	46½	160	160	476.7
November	71½	574	18,337,495	172,395,594	190,733,089	6,357,769	642	2,052	25	152	40½	160	160	489.6
December	219½	477½	54,646,095	142,322,313	196,968,408	6,353,819	709	619	25	164½	47	160	160	457.6
Totals and averages	3,264	5,108	812,883,710	1,537,531,683	2,350,415,393	6,421,899	8,701	1,217	25	2,490	500½	160	160	444.0

Total Capacity.—785,000 gallons per day.

ROXBOROUGH AUXILIARY STATION.

No. 1.—Knowles.—Capacity, 500,000 gallons per day.
No. 2.—Knowles.—Capacity, 285,000 gallons per day.

1888.	Running Time of each Engine in Hours.		Gallons Pumped by each Engine.		Total Pumpage of each Month.	Average Pumpage per Day.	Coal.		Percentage of Ashes.	Oil. / Cylinder.	Main Water Pressure.	
	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	No. 1.	No. 2.
January	20½	51	549,800	606,947	1,156,747	37,314	10	1,772	20	7	33	33
February	30	34	742,400	409,057	1,151,457	39,705	8	291	20	7	34	34
March	27	45	653,200	539,814	1,193,014	38,484	8	1,007	20	5½	34	34
April	22	43	599,850	555,698	1,155,548	38,518	6	1,886	19	7	34	34
May	44	29	516,813	744,050	1,260,863	40,673	5	1,106	19	4½	35	35
June	13	74	306,650	864,061	1,170,711	39,023	5	341	20	8½	36	36
July	61	29	725,582	711,000	1,436,582	46,341	5	513	20	8	35	35
August	37	69	634,350	1,028,885	1,663,235	53,652	5	1,996	20	10½	35	35
September	37	57	810,300	660,462	1,470,762	49,025	4	1,531	20	7¾	36	36
October	38	51	867,800	606,133	1,473,933	47,546	7	1,363	20	8	34	34
November	39½	41	913,500	482,636	1,396,136	46,537	7	439	20	7½	35	35
December	39½	50	791 050	602,074	1,393,124	44,939	9	1,090	20	8	35	35
Totals and averages	408½	573	8,111,295	7,810,817	15,922,112	43,503	84	2,135	20	89¼	35	35

heater for feed water put under floor of No. 1 engine-house for donkey pumps to exhaust through; donkey pumps repaired and kept in working order.

BOILERS.

Boilers 1 to 4, inclusive; tubes taken out, boilers thoroughly cleaned; the tubes found to be too thin to be safe-ended, new ones were put in; several patches put on the furnaces where blistered and cracked; stop valves altered on boilers, safety valves ground, new joints made, all connections examined and put in condition.

Boilers 5 to 7, inclusive; boilers entirely torn down and reset; new wall side and back, new bridge walls and furnaces; new buck stays and flue; all joints made new; safety valves ground, and all other connections put in good condition.

Boilers 8 to 9 cleaned and painted, and all connections examined.

AUXILIARY WORKS.

Basin was emptied to rebuild stop-houses and repair stops; the walls of the stop-houses were repaired and pointed, new covers put on them; a lot of decayed timber was taken out of the basin; the banks were kept mowed and slopes cleaned; the engine and boiler house white-washed and painted; walls underpinned and new mains laid under the walls; steps and bridge repaired; the tanks on Ridge avenue cleaned and painted; engine and boilers kept in good working order.

MOUNT AIRY.

BUILDINGS AND GROUNDS.

The stone wall extending out over pavement was torn down and put up on house line, grounds cleaned, banks of reservoir kept mowed, slopes weeded and cleaned, fence and coal shed repaired.

Total Capacity.—2,000,000 gallons per day.

MOUNT AIRY PUMPING STATION.

No. 1.—Davidson's Rotary.—Capacity, 1,000,000 gallons per day.
No. 2.—Davidson's Rotary.—Capacity, 1,000,000 gallons per day.

1888.	Running Time of each Engine in Hours.		Gallons Pumped by each Engine.		Total Pumpage of each Month.	Average Pumpage per Day.	Coal.		Percentage of Ashes.	Oil.		Mean Water Pressure and Mean Suction Lift in lbs. per sq. inch.		Gallons raised 100 feet per pound of coal.
										Cylinder.	Engine.			
	No. 1	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 1.	No. 2.	
January	.....	744	.....	25,362,000	25,362,000	818,129	55	796	20	31	15½	.....	57	272.8
February	.....	696	.....	23,505,375	23,505,375	810,530	52	1,592	20	29	14½	.....	57	265.5
March	223	519	7,213,625	17,762,175	24,975,800	805,670	61	2,071	20	45	17½	57	57	240.1
April	54	660	1,796,000	22,762,700	24,558,700	818,623	54	399	20	33½	15	57	57	269.9
May	.....	744	.....	26,508,625	26,508,625	855,116	55	1,257	20	37½	16	.....	57	284.0
June	4	707½	122,125	27,488,750	27,610,875	920,362	56	1,923	20	37½	22	57	57	301.6
July	.....	744	.....	28,809,875	28,809,875	929,350	59	1,056	19	31	31	.....	57	288.4
August	48	696	2,054,200	27,928,300	29,982,500	967,177	65	859	20	33½	33	57	57	273.0
September	51	664	1,860,125	25,679,500	27,539,625	917,987	58	1,461	20	38	33	57	57	279.6
October	132	612	4,832,000	22,845,000	27,677,000	892,806	61	523	19	42	41	57	57	269.1
November	.....	720	.....	26,510,000	26,510,000	883,666	59	2,157	17	30	30	.....	57	263.2
December	.....	744	.....	26,422,500	26,422,500	852,338	51	1,801	20	31	31	.....	57	303.7
Totals and averages.	512	8,250½	17,878,075	301,584,800	319,462,875	872,646	693	215	20	419	299½	57	57	274.4

MACHINERY.

New valve seats in pumps of both engines, and new gum valves put in; packing set out in cylinders; air pumps repaired; exhaust of high pressure engine ran under ground to avoid the steam in the street; donkey pumps put in and connected to boilers.

Boilers cleaned and painted, blows, safety valves, gauges and gauge cocks examined.

CHESTNUT HILL.

BUILDINGS AND GROUNDS.

The basin drawn off and cleaned of all rubbish; walls rebuilt, and stop well repaired, a new bridge built over it; a new wall built with cement at northeast corner to keep the water from a small basin adjoining from draining into it; the banks on the west side raised and drains laid; screens put over discharge pipes and part of coping reset; the basin on the county line drawn off and cleaned out; walls and fence repaired; the fence on the county line road set back to basin wall; the floor in the tank tower repaired, and the tanks cleaned out and examined; roof of tower repaired; engine and fire room white-washed.

ENGINES.

Exhaust pipe connected to a drain pipe to condense the steam; No. 1 and No. 2 kept in good condition at all times.

BOILERS.

New connections made from cylinder boilers to mud drums; furnaces repaired, and all connections and valves examined.

Total capacity, 750,000 gallons per day.

CHESTNUT HILL PUMPING STATION.

No. 2—Knowles. Capacity, 250,000 gallons per day.
No. 3—Worthington Duplex. Capacity, 500,000 gallons per day.

1888.	Running Time of each Engine in Hours		Gallons Pumped by each Engine.		Total Pumpage of each Month.	Average Pumpage per day.	Coal.		Percentage of Ashes.	Oil.		Mean Water Pressure and Mean Suction Lift in lbs. per sq. inch.		Gallons raised 100 ft. per pound of coal.
										Cylinder.	Engine.			
	No. 2.	No. 3.	No. 2.	No. 3.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 2.	No. 3.	
January	.....	744	.....	8,321,040	8,321,040	268,420	25	1,311	18	23¼	23¼	.....	53	179.8
February	.....	687	.....	7,609,680	7,609,680	262,402	23	1,783	19	21¾	21¾	.....	53	176.8
March	.....	705	.....	8,096,400	8,096,400	261,174	24	910	18	22½	22½	.....	53	183.4
April	7	720	344,400	9,550,320	9,894,720	329,824	28	1,944	17	22½	22½	53	53	189.5
May	.....	744	.....	9,893,520	9,893,520	319,145	28	1,860	18	10¼	10¼	.....	53	189.7
June	102	631	4,723,200	11,015,160	15,738,360	524,312	34	374	20	22½	22½	54	53	254.7
July	.....	744	.....	13,403,520	13,403,520	432,371	31	1,988	19	23¼	23¼	.....	53	232.4
August	.....	744	.....	14,199,120	14,199,120	458,036	32	292	19	23¼	23¼	.....	53	244.4
September	8	361	511,680	6,640,920	7,152,600	238,420	17	1,363	21	12	11½	54	53	224.6
October	2	9	127,920	258,180	386,100	12,454	7	1,306	37	1½	.....	54	53	28.1
November	.....	3	.....	102,960	102,960	3,432	8	1,155	39	½	.....	.....	53	6.6
December	.....	4	.....	112,320	112,320	3,623	6	643	36	½	.....	.....	53	9.8
Totals and averages	119	6,096	5,707,200	89,203,140	94,910,340	259,317	269	1,489	23	183¾	180¾	54	53	194.6

FRANKFORD.

BUILDINGS AND GROUNDS.

New closets built for men over wash room; roof over engine and fire room repaired; shutters fitted in ventilators; fire-room, cellar and pump-room whitewashed; a large tank made of pipe put underground for illuminating oil; wharf and fence repaired.

MACHINERY.

Engine No. 1.—Cylinder heads taken off and packing set out; slide valves reset; throttle valve ground in; air-pump valves renewed; pump valves renewed as required; lost motion taken out of all journals.

Engine No. 2.—The low pressure piston was found to be cracked and a new one put in; new spring for valve gear; air-pump valves all renewed; new studs and valves put in pumps; the high pressure cylinder head was found to be cracked in the stuffing box; a wrought-iron band was shrunk on and it made secure; all lost motion taken up, and new joints made on steam-pipes.

BOILERS.

Boilers all stripped of the old covering and covered with St. John's asbestos covering; new bridge wall built and all boilers cleaned; new joints made on stop valves; safety-valves ground in; water gauges cleaned; one new steam gauge put up; boiler fronts and pipes painted.

Donkey pumps repaired and a feed water heater put in under the boilers heated by the donkey exhaust.

WENTZ FARM RESERVOIR.

The steps in northeast corner, under fountain, was found to be washed out, and the clay under the brick lining for a distance of fifty feet each side of steps was washed out down to

Total Capacity, 20,000,000 gallons per day.

FRANKFORD PUMPING STATION.

No. 1.—Marine Compound Rotary.—Capacity, 10,000,000 gals. per day.
No. 2.—Corliss Compound Rotary.—Capacity, 10,000,000 gals. per day.

1888.	Running Time of each Engine in Hours.		Gallons Pumped by each Engine.		Total Pumpage each Month.	Average Pumpage per day.	Coal.		Percentage of Ashes.	Oil.		Mean Water Pressure and Mean Suction Lift in lbs. per sq. inch.		Gallons raised 100 ft. per pound of Coal.
										Cylinder.	Engine.			
	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 1.	No. 2.	
January	213	.....	76,056,930	.....	76,056,930	2,453,449	113	1,250	16	54	27	72	.....	544.7
February	113½	97	41,301,408	32,735,040	74,036,448	2,552,980	108	490	19	54	27	76	76	556.4
March	274½	32½	91,591,117	12,563,340	104,154,457	3,359,821	135	1,230	17	59	44	76	78	625.0
April	449	98½	173,276,044	35,216,154	208,492,198	6,949,739	279	2,150	23	49	95	77	77	605.7
May	686	10	262,196,448	3,390,258	265,586,706	8,567,313	358	1,360	21	58½	116	75	75	602.4
June	702¼	.....	271,614,375	.....	271,614,375	9,053,812	330	1,600	24	60	120	72	.....	668.0
July	306½	321¾	112,172,445	110,699,628	222,872,073	7,189,421	250	1,600	25	60½	108½	75	75	723.0
August	339½	333	127,426,668	116,607,417	244,034,085	7,872,067	273	2,080	24	59	116	76	75	724.6
September	344¾	343½	133,629,204	125,837,388	259,466,592	8,648,886	291	760	25	62	105	75	76	724.4
October	517½	160¼	184,012,383	57,540,690	241,553,073	7,792,034	292	920	25	58	115	80	75	671.9
November	184½	480¾	65,267,892	165,151,644	230,419,536	7,768,065	282	120	25	112	56	75	77	632.8
December	257¾	346¼	92,678,667	118,753,466	211,432,133	6,820,391	262	720	25	58	103	76	75	655.5
Totals and Averages	4,388¾	2,223½	1,631,223,581	778,495,025	2,409,718,606	6,586,662	2,979	840	22	739	1,032½	75	75	657.8

the ten feet line. The bricks were taken up, clay hauled up and put in and thoroughly rammed and paved. The steps were taken out and a brick apron built under the fountain. The entire east slope was repaired; banks graded; top levelled off and properly graded; ground cleaned up, and watch-house repaired and painted.

KENSINGTON.

BUILDINGS AND GROUNDS.

The wharf repaired; portion of a new cap log and guard fender put on; coal shed straightened up; new floor laid, and track repaired; a portion of the ceiling renewed, lathed and plastered; new skylight put in over fire room; roofs repaired over engine and boiler-house; engine and fire-room, coal-shed, boiler tops, and cellar whitewashed; engine-room floors and bath and dressing room painted; the office painted, grained and varnished.

ENGINE.

Air-pumps repaired; pins connecting the trunks to pistons; studs in air-pumps renewed; cylinder heads taken off and packing examined; pump-head removed and pump valves replaced where required; the engines and pumps painted, striped and varnished.

BOILERS.

Boilers cleaned and furnaces repaired; a portion of a sheet of No. 4 boiler was found to be thin around blow-off-pipe, and a part of new sheet put in; all valves and joints examined.

LEHIGH BASIN.

The pavement on Somerset street was paved by contract from Sixth to Eighth streets. The work was done in accor-

KENSINGTON PUMPING STATION.

No. 3.—Worthington Duplex.—Capacity, 6,000,000 gals. per day.

1888.	Running Time in Hours.	Gallons Pumped.	Average Pumpage per Day.	Coal.		Percentage of Ashes.	Oil.		Mean Water Pressure and Mean Suction Lift in lbs. per square inch.	Gallons raised 100 feet per pound of coal.
							Cylinder.	Engine.		
	No. 3.	No. 3.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 3.	
January	658	196,831,950	6,349,417	101	1,431	24	55	27½	50	478.5
February	581½	174,164,235	5,902,215	5	800	24	44½	25	50	476.5
March	333	100,218,111	3,232,842	139	692	25	30	14¾	50	413.6
April	340	107,530,185	3,584,339	147	423	24	34	16¼	50	420.0
May	484	145,093,725	4,680,442	184	2,035	24	65	22¾	50	451.1
June	640½	189,881,160	6,329,372	228	1,695	25	82	27	50	477.2
July	630	184,109,541	5,939,017	213	1,212	25	86	29	50	495.7
August	524½	151,473,672	4,886,247	183	377	24	69½	23	50	475.5
September	47	13,967,525	465,587	30	1,859	25	5½	5	50	260.5
October	13½	3,883,803	125,284	26	743	24	1	½	50	84.8
November				19	693	25	2	2	50	
December				22	816	24	½	½	50	
Totals and averages	4,252	1,267,154,007	3,462,169	1,302 Soft coal. 178 Gas coke. 6,901	1,576 coal. 1,155 e.	24	475	193¼	50	435.8

1888.	Average per Day.	Percentage of Pumpage.	Maximum Gallons for one Day.	Mimimum Gallons for one Day.	Total Steam Pumpage.
January	80,277,558	6.71	96,020,209	48,376,621	1,545,120,390
February	83,034,333	6.49	97,859,283	62,239,818	1,582,453,832
March	83,185,066	6.95	100,867,257	53,632,138	1,609,330,261
April	86,816,459	7.03	100,257,001	66,440,971	1,670,328,948
May	98,897,245	8.28	116,853,216	86,272,726	1,857,821,381
June	117,291,017	9.49	133,710,157	85,854,034	2,550,818,811
July	112,354,197	9.39	130,303,763	92,848,989	2,891,147,907
August	117,672,231	9.85	133,202,943	93,659,912	2,907,538,557
September	115,677,376	9.37	138,674,777	96,776,905	2,457,900,040
October	114,904,547	9.61	133,890,950	102,967,088	2,488,258,803
November	107,979,186	8.74	136,326,066	83,854,153	2,270,731,410
December	96,833,234	8.09	117,779,094	61,898,424	1,996,199,980
Totals and averages	101,280,774	100.00			25,827,650,320
Increase over 1887	12,525,134		20,070,698		3,506,607,188
Decrease from 1887				12,857,114	

dance with the specifications furnished by the Bureau of Water. An iron fence was put up on Sixth, Lehigh avenue and Eighth streets, with gates on Lehigh avenue at Sixth, Seventh and Eighth streets, and at Eighth and Somerset streets; fence painted the whole length; the old wood fence was taken down; the banks on Somerset street was filled in behind walls, graded and sodded; the steps on the northeast corner was removed and the banks graded; the inside slope was repaired and weeded; the valves in the stop-house at Eighth and Lehigh avenue were taken out and a 16-inch stop put in; pavements repaired on Lehigh avenue and in the stop houses.

MACHINE SHOP.

TWELFTH AND REED STREETS.

Windows cut through to front and back ends of building, and window frames set. Foundation for hoisting crane built; foundation built for platform scales; roof repaired and painted, partition painted; glass put in new sash and windows and sash painted.

FIRST DISTRICT.

Office painted, grained and varnished. Roof repaired.

SECOND DISTRICT.

Paved around office, pointed walls, and roof repaired.

THIRD DISTRICT.

Office plastered and painted and the roof and rain conductors repaired.

FOURTH DISTRICT.

Painted fences and office. Puddlers repaired and inlets built.

NEW OFFICE.

JUNIPER AND FILBERT STREETS, SECOND FLOOR.

Rooms fitted up for Chief Engineer, chief clerk, assistant engineer, telephone and type writer operators, water committee and General Superintendent; the holes in walls and ceilings closed up, lathed and plastered: book cases, racks and closets built in chief clerk's and assistant engineer's room; doors cut, partitions put up, windows re-hung, floors repaired, walls and ceilings papered; all wood-work painted with three coats; windows glazed; retiring room built in telephone and type writer's room. Steps repaired; storm doors built for Filbert street entrance; signs made and painted; rooms all furnished and carpeted; gas fixtures put in each room with electric attachments.

THIRD FLOOR.

Fit up for drawing room with closets, cases for drawings, blue print racks and drawing tables; a room fitted up for janitor and telephone lineman; fitted with shelves for reports and records all painted and walls and ceilings papered.

The iron fence around the Square at Twelfth and Reed streets was taken down and hauled to Lehigh basin.

The Telephone at different works, basins and districts were kept in good working order.

APPENDIX D.

REPORT

ON THE

OPERATIONS IN CONNECTION WITH THE

DISTRIBUTION SYSTEM

DURING 1888.

BUREAU OF WATER,

January 20, 1888.

MR. JOHN L. OGDEN,
Chief Engineer of the Bureau of Water.

SIR:—I submit herewith the annual report on distribution for the year 1888.

The principal work during this year has been the laying of service mains, putting in new fire hydrants and stops, repairs and such incidental work as pertains to a large system of distribution.

Few supply or pumping mains were laid, the most work being confined to service mains, a large quantity of which were unfinished at the close of 1887. All these and all that were asked for during the year 1888—up to the time limited for breaking street pavements—have been laid, and the year 1889 will commence in this respect with the unusual circumstance of no unfinished work to do.

MAINS.

Number seven pumping main has been extended from the dead end at the stand pipe lot, laid 1885, to the East Park

reservoir, which it enters at the top of the bank at the intersection of the division and west bank.

This main is laid on an ascending grade throughout, and supplies the small basin through a temporary pipe, the intention being to provide a more suitable and ornamental inlet on the completion of the present unfinished section of the reservoir.

While laying this main, provision was also made for another one by laying a forty-eight inch pipe across the Connecting Railroad.

A thirty-six inch supply main is now being laid between the Spring Garden pumping station and the East Park reservoir to convey subsided water from the reservoir to number eight and number eleven engines, to be then pumped into the district now supplied from the river by direct distribution.

That portion of the main crossing the Connecting Railroad, with provision for an additional forty-eight inch pipe, in case it is needed in the future, has been laid, and the balance of the thirty-six inch main is expected to be completed this winter.

During the past summer numerous complaints were received of a short supply of water in the lower part of the city, particularly in that portion south of Washington avenue and between Moyamensing avenue and Broad street. This section is about one mile square, densely populated, and was entirely without supply or feeding mains except on the east, west and north boundaries, thus depending for the distribution of water on the three, four and six inch service pipes and one short ten inch main on Eleventh street.

To better supply this section a sixteen inch main was laid through its centre on Dickinson street, connecting to the twenty inch main on Broad street and to the sixteen inch main on Moyamensing avenue, and at the intersection of all intermediate streets. The result was a pressure in the immediate vicinity of Dickinson street double that previously existing,

and a sufficient improvement throughout the section to give an adequate supply for the present.

A sixteen inch supply main was laid on Fairmount avenue from the thirty inch main on Twenty-second street to the sixteen inch main on Twentieth street, the intention being to supply the East Park water to that part of the city bounded by Vine and Spring Garden streets, and Broad street and the Schuylkill river. It was found, however, impossible to convey a sufficient quantity of water to this section with the mains now in use. To accomplish this the sixteen inch main will have to be extended from Fairmount avenue to Vine street.

At the Roxborough reservoir the valves in the northeastern stop-house were found to be defective. The reservoir was emptied and the valves repaired. Previous to this the stand pipe in this stop-house had been closed at its upper end, so as to permit of pumpage from the Roxborough Works direct to Mount Airy, through the twenty inch main running through the bottom of the Roxborough reservoir.

To supply Manayunk a new connection was put in, extending from the thirty inch outlet at the eastern corner of the reservoir to the Manayunk main.

The supply for Manayunk and Germantown is now separated, so as to be independent of each other, and both localities can receive a larger quantity of water than was formerly the case.

Distribution.

On the 8th of March the Frankford water was let into the recently completed thirty inch main, extending from the Frankford reservoir to Sixth and Lehigh avenue, to supply the section between American and Sixth streets, north of Lehigh avenue.

April 5th this section was extended south to Jefferson street, but it was found the water could not be properly distributed. The southern line was then changed from Jefferson street to Susquehanna avenue, where it now remains with satisfactory results.

In addition to supplying the above section this main is also used to keep up the supply of Lehigh reservoir, by means of which the pumpage at the Kensington works was almost entirely dispensed with during the latter half of the year.

Alterations have been made to the mains and connections at the Corinthian avenue reservoir, so that the north and south mains in Poplar street can at any time be supplied with East Park or Corinthian water, as may be desired.

Since making these changes the water from the East Park reservoir has been principally supplied through the two thirty inch mains, which partly supply that section of the city lying east of Broad and north of Vine streets. With the exception of the use of the East Park and Frankford waters, as mentioned above, the distribution from the various works and reservoirs remains practically the same as it was January 1st, 1888.

The following shows the source, works, reservoirs and localities as they are now supplied:

Source of supply.	Pumping works.	Reservoirs.	Wards supplied.
Schuylkill River.....	Belmont.....	George's Hill.....	24th and 27th Wards.
Schuylkill River.....	Roxborough.....	Roxborough	21st and part of 28th Wards.
Schuylkill River.....	Roxborough.....	Mount Airy.....	22d, part 25th, and 28th Wards, Chestnut Hill, part 22d Ward.
Schuylkill River.....	Spring Garden.....	By direct pump'ge	29th, and part of 15th, 19th, 20th, and 28th Wards.
Schuylkill River.....	Fairmount.....	Fairmount	1st, 2d, 3d, 4th, 26th, and 30th Wards.
Schuylkill River.....	Fairmount.....	Corinthian	5th, 6th, 7th, 8th, 9th, 10th, and part of 15th Wards.
Schuylkill River.....	Spring Grden..... ..	East Park..... / Lehigh.....	11th, 12th, 13th, 14th, 16th, 17th, 18th, 31st, and part 19th, 20th, and 25th Wards.
Delaware River.....	* Frankford.....	Frankford	23d, and part of the 19th, 20th, and 25th Wards.

* Frankford water is sometimes run by gravity into the Lehigh Reservoir.

The distribution of water has been under great disadvantage for a number of years past, owing to the need of sufficient

distributing mains and reservoir capacity; on these accounts one reservoir is out of use and another receives daily its full capacity direct from the river, and there is therefore little, if any, chance for the water to settle before being used by consumers.

The construction of the East Park reservoir will enable a change to be made in the distribution of water as soon as the necessary mains can be laid, so that the Delaware, Spring Garden, Corinthian, Fairmount and East Park reservoirs shall have at least from six to eight days, or more, supply for the several districts depending upon them. To do this the distribution should be arranged as follows:

FAIRMOUNT RESERVOIR.

Should supply east of Broad street and south of Washington avenue.

SPRING GARDEN AND CORINTHIAN RESERVOIRS.

Should supply south of South street, between Broad street and the Schuylkill River; also east of Broad street, between South street and Washington avenue.

EAST PARK RESERVOIRS.

Should supply between Vine and South streets and the Delaware and Schuylkill Rivers; also north of Vine street east of Broad street, the northern boundary, beginning at Broad and Jefferson streets; thence along Jefferson street to Ninth street; to Susquehanna avenue; to American street; to Lehigh avenue; thence along the center of Lehigh avenue to the Delaware River.

DELAWARE RESERVOIRS.

Should supply all the Twenty-fifth Ward, east of American street.

To supply as above described the following mains are needed:

SUPPLY MAINS.

	Size.	Cost.
From East Park reservoir to American street	48-inch,	$200,000
From East Park reservoir to Twenty-fifth and Spring Garden streets	48-inch,	150,000
From Twenty-second and Poplar to Corinthian avenue and Poplar street	48-inch,	12,000
From Twenty-second and Poplar to Corinthian avenue and Girard avenue	30-inch,	7,500
From Fairmount reservoir to Broad and Washington avenue	30-inch,	96,000

PUMPING MAINS.

From Spring Garden Works to East Park reservoir	48-inch,	22,000
From Twenty-sixth and Poplar streets to Spring Garden reservoir	36-inch,	9,500
Total		$497,000

In addition to the above the following mains are also needed for the better supply of other portions of the city.

SUPPLY MAINS.

FOR THE DIRECT PUMPAGE DISTRICT.

Including the Twenty-ninth and part of the Fifteenth, Nineteenth, Twentieth, and Twenty-eighth Wards.

	Size.	Cost.
Twenty-seventh street, from Thompson street to Montgomery avenue	36-inch,	$22,000
Twenty-seventh street, from Montgomery avenue to Ridge avenue, to Twenty-ninth street, to York street	30-inch,	25,000
Montgomery avenue, from Twenty-seventh to Twenty-fourth street; Twenty-fourth street, from Montgomery avenue to Norris street; Norris street, from Twenty-fourth to Broad street	20-inch,	23,000
Dauphin street, from Broad to Twenty-ninth street	20-inch,	22,000

For West Philadelphia.

	Size.	Cost.
Fifty-second street, from Walnut to South street	30-inch,	$14,000
South street, from Fifty-second to Forty-ninth street	20-inch,	5,500
Forty-ninth street, from South to Woodland avenue	12-inch,	8,500
Fortieth street, from Pine to Woodland avenue	12-inch,	1,200
Woodland avenue, from Fortieth to Forty-ninth street	12-inch,	8,200
Locust street, from Thirty-eighth to Fifty-second street	16-inch.	23,000

For Twenty-third and part of the Twenty-fifth Ward.

	Size.	Cost.
Kensington avenue, from Lehigh to Allegheny avenues	30-inch,	$27,000
Allegheny avenue, from Kensington avenue to Richmond street	16-inch,	17,000
Lehigh avenue, from Cedar to Richmond streets	30-inch,	14,000
Richmond street, from Lehigh avenue to near Tioga street	12-inch,	12,000
Richmond street, from Wheat Sheaf lane to Bridge street	12-inch,	13,000
Richmond and Lefever streets to Margaretta and Frankford avenue	12-inch,	18,000
Bridge street, from Tacony road to Foulkrod street; thence to Frankford avenue	12-inch,	12,600

For improvement of supply in the Twenty-first, Twenty-second and part of the Twenty-eighth Wards.

	Size.	Cost.
Ridge avenue, from west of Rodman street to east side of Wissahickon bridge, and from the west side of Wissahickon bridge to Hermit street	12-inch,	$14,000
Germantown avenue, from Broad to Eighteenth streets	10-inch,	7,300
Nicetown lane, from Pulaski to Germantown avenues	10-inch,	2,300

There are also needed two pumping mains.

One from the Frankford Works to Frankford reservoir	30-inch,	$175,000
One from the Roxborough to the Mount Airy reservoirs	30-inch,	122,000
Total		$586,600

Which, with the previous amount, $497,000, will make $1,083,600 for mains, the greater portion of which are badly needed at the present time.

During the past year considerable trouble has been experienced with the Frankford pumping main; a large number of

the lead joints have been forced out sufficiently to leak, and the breeches pipe at the pumping works was broken by pressure or ram from the pumps. The broken pipe was removed and the main repaired temporarily with straight pipe, this being the most expedient way of getting it into immediate use.

As soon as possible a breeches pipe was procured, and was put in July 1st. At the same time the check valve west of Oxford Pike was removed and placed near the reservoir.

This check valve was moved on account of its being placed between the connection on Oxford Pike and the reservoir, thus preventing the use of the main as a supply main whenever it might be desirable to do so.

A serious break occurred on Sixteenth street below Green street, where a 20-inch main, laid 1871, split on its upper side, from the bead end towards the bell, a distance of seven feet. The water forced its way to the surface with a sufficient force to send it over the tops of the houses on the opposite side of the street, doing considerable damage.

After the water was shut off and the pipe uncovered, it was found the crack had closed, and as there was no indication of any weakness in the structure of the pipe or quality of the iron, no positive reason can be given why the break should have happened. At the Spring Garden Works No. eleven pumping main was forced apart. In front of the works there is an angle of 45° in the main and the shoring for holding it in position, at this point, had by some means been removed.

The main was immediately repaired and made safe by the construction of a stone buttress.

The submerged main has been out of use for a number of years past, the reason being several broken places and leaky joints that made it useless in its present condition.

Last spring an examination was made, and no indication of leaks was found, except near the east shore, and an attempt was made to repair these from the inside of the pipe, but while working at them other leaks were discovered. It was then

decided to empty the main to more fully determine its condition, which was done, and several additional leaks of a serious nature were found, the repairing of which was proceeded with, the main being kept empty by means of a rotary pump.

While doing this work the pipe moved, and some of the joints opened to such an extent that it was deemed too dangerous to continue the work under the circumstances.

The reason for the pipe moving, and probably a reason for a number of its defects, is that the East Park river drive has been built since the main was laid, extending fully one hundred feet into the river.

The filling of this roadway twenty or twenty-five feet high over the main (which lies on a partly rock and partly mud bottom) has caused it to settle, so that one of the joints within the bank and under the drive is almost open on one side and leaked badly.

Had these leaks remained undiscovered until the main was put into use they would have undermined and washed out a great portion of the river drive. A survey of the main shows no objectionable features in elevation, but the deflections up and down stream are frequent and sharp, varying from a straight line nine feet ten inches on the lower to eighteen feet eight inches on the upper side.

In its present condition the main is useless, and as it is of too much value to be abandoned, it should be repaired, either by a further effort to do so inside the pipe, or by relaying the defective portion.

WORK PERFORMED.

Mains.

One hundred and twelve thousand seven hundred and nineteen (112,719) feet of service mains; six thousand eight hundred and eighty-three (6,883) feet of supply mains, and

one thousand nine hundred and fifty-five (1,955) feet of pumping mains have been laid during the past year; which, in addition to connections and other new work, make a total of one hundred and thirty-three thousand five hundred and fifty-two (133,552) feet, or twenty-five (25) miles, and one thousand five hundred and fifty-two (1,552) feet added to the distribution system, and a total of nine hundred and one (901) miles and two thousand seven hundred and six (2,706) feet now in use.

There have been used for relaying old and defective service mains and for alterations nineteen thousand and twenty-six (19,026) feet of pipe.

One hundred and forty-nine (149) feet of 1½-inch, seven thousand nine hundred and eighty-eight (7,988) feet of 3-inch, seven thousand and forty-seven (7,047) feet of 4-inch, and five hundred and sixty-one (561) feet of 6-inch pipe have been taken up.

The total amount used for relays and repairs was twenty-four thousand four hundred and fifteen (24,415) feet, and the amount taken up, lowered, raised and shifted was twenty-one thousand five hundred and twenty-eight (21,528) feet, making the total for repairs forty-five thousand nine hundred and forty-three (49,943) feet.

The total pipe handled for all purposes throughout the year was one hundred and seventy-nine thousand four hundred and sixty (179,460) feet; or seven millions eight hundred and forty-three thousand and ten (7,843,010) pounds.

Fire Hydrants.

Five hundred and fifty-nine (559) new and twenty-one (21) old style fire hydrants have been put in new locations. One hundred and eighty-six (186) new and one hundred and three (103) old style have been substituted for defective ones of the old pattern, making a total of seven hundred and forty-five (745) new and one hundred and twenty-four (124) old style hydrants put in during the year, and the total number of

fire hydrants in use six thousand nine hundred and twenty-nine (6,929), of which two thousand two hundred and eighty (2,280), or about thirty-three per cent., are of the new pattern, and were puts in during the past four years.

Drills.

The number of new attachments made is eight thousand seven hundred and eighty-eight (8,788), as follows:

½ inch	8,260	area of total openings.....	...1,622 square inches.
⅝ inch	193	area of total openings.....	59 square inches.
¾ inch	139	area of total openings.....	61 square inches.
1 inch	118	area of total openings.....	93 square inches.
1½ inch	23	area of total openings.....	41 square inches.
2 inch	55	area of total openings.....	173 square inches.
Total.....	8,788		2,049

One thousand one hundred and ninety-five (1,195) shut-offs have been made for repairs, for which permits were granted, and three hundred and thirteen (313) without permit; making a total of fifteen hundred and eight (1,508).

Meters.

Ten (10) meters have been set in new locations, thirty-nine (39) that were defective (or where a different meter or size was required) have been renewed, and sixteen (16) were taken out where the use of water by meter was discontinued.

The total number in use December 31st, 1888, was two hundred and sixty-seven (267); the number set, but dismantled by the removal of the piston, eighteen (18); and the number in stock three hundred and forty-three (343), making a total of six hundred and twenty-eight (628).

The following tables and schedules show in detail the work done.

Respectfully,

ALLEN J. FULLER,

Assistant Engineer in charge of Distribution.

IRON SERVICE AND SUPPLY MAINS LAID IN 1888.

First District.

Comprising the First, Second, Third, Fourth, Twenty-sixth, and Thirtieth Wards.

Street. Location.	Size in inches.	Distance in feet.
Service Mains.		
Bainbridge street, from the centre of Twenty-sixth, to the east house line of Chippewa	6	426
Barnwell street, from Bainbridge to South	6	322
Broad street, west side from dead end 325 feet north of north house line of Dickinson, to the center of Reed	6	100
Broad street, west side from the centre of Moore, to 225 feet north of the centre of Tasker, to connect dead end	6	1,125
Broad street, west side, from the centre of Wolf, north	6	60
Broad street, east side, from the centre of Ritner, to the centre of Wolf	6	460
Corn street, from 17 feet south of the north house line of Reed, north	6	19
Devon street, from 29 feet south of the centre of Federal, north	6	29
Dorrance street, from 351 feet south of the centre of Morris, north	6	351
Dudley street, from Fourth to Fifth	6	450
Earp street, from 219 feet west of the centre of Long lane, to 382 feet west of the centre of Twenty-second	6	608
Emily street, from 12 feet east of west house line of Fourth, to the centre of Fifth	6	437
Gerritt street, from the centre of Twenty-second, west	6	300
Hicks street, from the centre of Moore, to Morris	6	450
Hicks street, from the centre of Tasker north, to connect dead end	6	84
Latona street, from dead end, 78 feet east of east house line of Twenty-third, west	6	87
Lilly Ann street, from Fitzwater to Bainbridge	6	357
Linnard street, from the centre of Thirty-sixth, west	6	392
McClellan street, from 12 feet east of west house line of Twentieth, to the centre of Twenty-first	6	532
Mercy street, from the west curb line of Fourth, to the centre of Fifth	6	437
Mole street, from Moore to Morris	6	450
Mole street, from the centre of Tasker north, to connect dead end	6	84
Moore street, from Nineteenth to Twentieth	6	446
Morris street, from the centre of Dorrance west, to connect dead end	6	68
Morris street, from 85 feet east of the centre of Seventeenth, west	6	85
Nineteenth street, from the centre of Moore, to 2 feet south of the south curb line of Watkins	12	285

Street. Location.	Size in inches.	Distance in feet.
Service Mains—Continued.		
Parker street, from the south house line of Washington avenue, north	6	30
Pierce street, from Nineteenth to Twentieth	6	446
Pierce street, from dead end, 12 feet east of the centre of Twenty-first, west	6	12
Reed street, from 153 feet west of the centre of Long lane, to 212 feet west of the centre of Twenty-second	6	426
Sears street, from 191 feet west of the west house line of Twenty-first, to 378 feet west of the centre of Twenty-second	6	615
Seventeenth street, from 58 feet north of the north house line of Moore, to dead end 6 feet south of north house line of Morris	6	384
Siegel street, from 12 feet east of west house line of Twentieth, to the centre of Twenty-first	6	532
Titan street, from the centre of Twenty-second, to 1 foot west of east house line of Twenty-third	6	446
Twenty-first street, from Siegel to Watkins	6	582
Twenty-second street, from 12 feet south of south house line of Dickinson, to south house line of Titan	12	1,064
Twenty-sixth street, from the centre of Bainbridge, north	6	25
Ward street, from Federal to Ellsworth	6	327
Wharton street, from Twenty-first to Twenty-second	6	451
Wilder street, from the centre of Twenty-second, west	6	363
Wolf street, from 37 feet west of east curb line of Broad, west	6	26
Total		14,173
Supply Mains.		
Dickinson street, from 12 feet east of the south-east house line of Moyamensing avenue, to 54 feet west of east house line of Broad	16	5,089
Dickinson street, from 54 feet west of east house line of Broad, west	30	6
Total		5,095
Supply Main connections.		
Broad and Dickinson streets, between 6-inch main on east side of Broad and 16-inch main on north side of Dickinson	10	14
Dickinson street, north side, southeast house line of Moyamensing avenue, between 4 and 16-inch mains	10	7

Street. Location.	Size in inches.	Distance in feet.
Supply Main connections—Continued.		
Dickinson street, north side, 12 feet east of east house line of Fourth, between 4 and 16-inch mains	10	7
Dickinson street, north side, 19 feet 8 inches east of east house line of Fifth, between 4 and 16-inch mains	10	7
Dickinson street, north side, 6 feet 4 inches east of east house line of Sixth, between 4 and 16-inch mains	10	6
Dickinson street, north side, 22 feet east of east house line of Seventh, between 4 and 16-inch mains	10	7
Dickinson street, north side, 28 feet east of east house line of Eighth, between 6 and 16-inch mains	10	7
Dickinson street, north side, 14 feet east of east house line of Ninth, between 6 and 16-inch mains	10	7
Dickinson street, north side, 28 feet 8 inches east of east house line of Tenth, between 6 and 16-inch mains	10	7
Dickinson street, north side, 8 feet east of east house line of Twelfth, between 6 and 16-inch mains	10	8
Dickinson street, 11 feet 6 inches east of east house line of Thirteenth, between 6 and 16-inch mains	10	8
Total		85
Fire hydrant connections	6	1,419
Fire connections (private).		
Eighth street, east side, 37 feet south of south house line of Cantrell, for Penn Match Co	4	18
South street, south side, 130 feet east of east house line of Twelfth, for Standard Theatre	4	12
Twenty-third street, east side, 20 feet 2 inches north of north house line of Alter, for Wm. G. Pennypacker	4	18
Total		48
Supply connections (private.)		
Broad street, east side, 110 feet south of south house line of Wolf, for Methodist Episcopal Hospital	4	12
Drains.		
Wharton street, south side, east of Twelfth. First District Yard	6	25

Street.	Location.	Size in inches.	Distance in feet.
	Pipe relaid.		
Birch street,	from 29 feet south of the centre of Fitzwater north	6	29
Clare street,	from Carpenter to Sixth	6	456
Clark street,	from Third to Fourth	6	450
Earp street,	from 33 feet west of west house line of Eighth west	6	33
Esprey street	from the centre of Catharine north	6	28
Florida street,	from the centre of Catharine north	6	28
Holly street,	from 28 feet south of the centre of Fitzwater north	6	28
Jessup street,	from the centre of Catharine north	6	28
Juniper street,	from the centre of Catharine north	6	27
Lloyd street,	from the centre of Fitzwater north	6	30
McIlwain street,	from Third to Fourth	6	450
Mechanic street,	from the centre of Carpenter to the east curb line of Parker	6	438
Moyamensing avenue,	from south to north house line of Reed	6	59
Plover street,	from 5 feet west of the centre of Seventh to the centre of Eighth	6	435
Redwood street,	from Third to Sixth	6	1,345
Reed street, north side,	from the centre of Second to 31 feet west of the southeast house line of Moyamensing avenue	6	467
Reed street, south side,	from 20 feet west of southeast house line of Moyamensing avenue west	10	7
Reed street, south side,	from the centre of Second to 20 feet west of the southeast house line of Moyamensing avenue	6	556
Rye street,	from 2 feet south of south house line of Reed north	6	19
Washington avenue, south side,	from Third to Fifth	6	907
Washington avenue, south side,	from 6 feet east of west curb line of Fifth to 3 feet west of the centre of Sixth	6	474
Washington avenue, north side,	from Third to Fifth	6	913
Washington avenue, north side,	from the centre of Sixth west	6	25
Woodbine street,	from Wharton to Federal	6	450
Wyoming street,	from the centre of Fitzwater north	6	28
	Total		7,710
Fire hydrant connections relaid		6	259

Street.	Location.	Size in inches.	Distance in feet.
Repairs, General		4	93
" "		6	659
" "		8	17
" "		10	10
" "		12	3
" "		16	17
" "		20	16
Total			815
	Pipes taken up.		
Birch street,	from 27 feet south of centre of Fitzwater, north	4	28
Clare street,	from Carpenter to Sixth	3	460
Clark street,	from Third to Fourth	3	455
Earp street,	from 33 feet west of west house line of Eighth, west	4	33
Esprey street,	from centre of Catharine, north	3	28
Florida street,	from centre of Catharine, north	4	28
Holly street,	from 27 feet south of the centre of Fitzwater, north	3	27
Jessup street,	from the centre of Catharine, north	3	28
Juniper street,	from the centre of Catharine, north	4	27
Lloyd street,	from the centre of Fitzwater, north	3	28
Mechanic street,	from the centre of Carpenter to the east curb line of Parker	4	428
McIlwain street,	from Third to Fourth	4	46
Moyamensing avenue,	from south to north house line of Reed	4	59
Plover street,	from 5 feet west of the centre of Seventh to the centre of Eighth	3	435
Redwood street,	from Third to Fifth	3	892
Redwood street,	from Fifth to Sixth	4	446
Reed street,	south side, from the centre of Second to 27 feet east of the west house line of Moyamensing	4	463
Reed street,	north side, from the centre of Second to 31 feet west of the east house line of Moyamensing	4	467
Rye street,	from 2 feet south of south house line of Reed, north	4	19
Washington avenue,	south side, frrm centre of Third to 37 feet west of centre of Sixth	4	1,382
Washington avenue,	north side, Third to Fifth	4	502
Washington avenue,	north side, from Sixth, west	4	30
Woodbine street,	from Wharton to Federal	3	400
Wyoming street,	from centre of Fitzwater, north	4	27
Total			6,738

Street.	Location.	Size in inches.	Distance in feet.
Fire hydrant connections taken up		3	8
" " "		4	389
" " "		6	33
Total			430
	Pipe cut off and abandoned.		
Washington avenue, north side, from 6 feet east of west curb line of Fifth, west		4	25
Fire hydrant connections cut off and abandoned		3	61
" " " "		4	576
" " " "		6	27
Total			664

Recapitulation of First District.

	Purposes for which used.	Size—Inches. 3	4	6	8	10	12	16	20	30	Totals in feet and pounds.
New pipe or feet added.	Service mains			14,173							14,173
	Supply mains							5,089		6	5,095
	Supply main connections					85					85
	Fire-hydrant connections			1,419							1,419
	Fire connections (private)		48								48
	Supply connections (private)		12								12
	Drains			25							25
	Total.... feet		60	15,617		85		5,089		6	20,857
	Total.... pounds		1,140	515,361		4,675		559,790		1,992	1,082,958
Pipe used, but adding nothing to feet in the ground.	Pipe relaid			7,962		7					7,969
	Repairs general		93	659	17	10	3	17	16		815
	Pipe taken up	2,761	4,374	33							7,168
	Total.... feet	2,761	4,467	8,654	17	17	3	17	16		15,952
	Total.... pounds	41,415	84,873	285,582	714	935	216	1,870	2,544		418,149
	Total handled... feet	2,761	4,527	24,271	17	102	3	5,106	16	6	36,809
	Total handled... pounds	41,415	86,013	800,943	714	5,610	216	561,660	2,544	1,992	1,501,107
	Pipe cut off and abandoned	61	576	27							664

Second District.

Comprising the Fifth, Sixth, Seventh, Eighth, Ninth, Tenth, Twenty-fourth, and Twenty-seventh Wards.

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains.		
Baring street.,	from dead end, 12 feet west of centre of Holly, to 19 feet 8 inches west of centre of Forty-second	6	163
Benton street,	from centre of Melloy, north	6	11
Brown street,	from centre of Thirty-seventh to dead end, 500 feet west of centre of Thirty-eighth	6	920
Budd street,	from 7 feet south of centre of Powelton avenue, to centre of Baring	6	447
Conestoga street,	from 2 feet 5 inches south of north house line of Thompson, to centre of Master	6	432
De Kalb street,	from centre of Aspen to centre of Brown	6	410
Elwyn street,	from dead end, 207 feet 9 inches north of centre of Cherry, to centre of Race	6	96
Evans street,	from centre of Summer north	6	7
Fairmount avenue,	from dead end east house line of Forty-fifth, to centre of Forty-sixth	6	296
Filbert street,	from dead end, 19 feet 9 inches east of centre of Forty-second, west	6	40
Forty-second street,	from Market to Haverford avenue	8	1,787
Forty-third street,	from 3 feet south of south house line of Baltimore avenue, north	6	42
Forty-fourth street,	from 190 feet south of south house line of Locust, to centre of Walnut	6	640
Forty-fifth-and-one-half street,	from 489 feet south of centre of Saybrook, north	6	489
Forty-sixth street,	from 423 feet 6 inches south of centre of Saybrook, to Woodland avenue	6	663
Forty-six-and-one-quarter (or June) street,	from 3 feet south of centre of Brown, to centre of Seneca	6	414
Forty-seventh street,	from 1 foot north of centre of Woodland avenue, north to connect dead end	6	333
Forty-eighth street,	from centre of Gray's Ferry road, north to connect dead end	6	40
Fiftieth street,	from 14 feet 6 inches north of centre of Lancaster avenue, to centre of Merion street	6	237
Fifty-first street,	from centre of Westminster avenue, to centre of Wyalusing avenue	6	494
Fifty-second street,	from centre of Westminster avenue, to centre of Wyalusing	6	499
Fifty-fourth street,	from dead end, 103 feet 8 inches south of centre of Lansdowne avenue, north	6	107
Fifty-sixth street,	from 260 feet southeast of centre of Woodland avenue, northwest	6	260

Street. Location.	Size in inches.	Distance in feet.
Service Mains—Continued.		
Fifty-seventh street, from dead end, 275 feet south of centre of Market, north	6	275
Gray's Ferry avenue, from 9 feet southeast of southeast curb line of Woodland avenue, to centre of Forty-eighth	6	396
Greenway avenue, from 305 feet 6 inches east of east house line of Forty-ninth, west	6	341
Hanson street, from 279 feet south of centre of Greenway avenue, north	6	279
Hickey street, from Melloy to 24 feet 6 inches south of centre of Market	6	334
Holly street, from Powelton avenue to Baring	6	483
Jacoby street, from 1 foot 6 inches south of centre of Race, north to connect dead end	6	101
Johnson street, from 5 feet west of centre of Twenty-first, west	6	17
Lansdowne avenue, from centre of Fifty-fourth, west	6	539
Melloy street, from Sixteenth to Benton	6	294
Merion avenue, from dead end, west house line of Forty-ninth, to west house line of Fiftieth	6	797
Ogden street, from centre of Markoe, west	6	175
Paschall avenue, from 15 feet east of west house line of Hanson, to centre of Forty-ninth	6	169
Pear street, from 1 foot east of west house line of Fifty-first, to Franklin	6	64
Powelton avenue, from dead end 383 feet west of west house line of Forty-second, to 10 feet south of centre of Market	6	1,017
Rockland street, from dead end east house line of Forty-second, west	6	50
Sansom street, from Forty-second to Forty-third	6	663
Saybrook street, from Forty-five-and-a-half to Forty-sixth	6	216
Sixty-third-and-a-half street, from Vine to Callowhill	6	558
Spring Garden street, from dead end east house line of Forty-second, west	6	50
Summer street, from Twenty-second to Twenty-third	6	307
Twenty-third, from 3 feet south of centre of Chestnut, to 34 feet north of centre of Johnson	10	271
Twenty-third street, from dead end 34 feet north of centre of Johnson, to 94 feet south of south house line of Market	12	110
Twenty-third street, from 25 feet south of centre of Market, north	12	86
Thirty-fourth street, from 3 feet south of centre of Haverford, north	6	3
Thirty-eighth street, from dead end 3 feet north of south house line of Brown, north	6	22
Thirty-ninth street, 1 foot north of centre of Warren, to 3 feet south of centre of Lancaster	6	313
Trinity place, from 340 feet east of east house line of Forty-ninth, west	6	374

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains—Continued.		
Upland street, from centre of Seventy-first, west		6	274
Wyalusing avenue, from dead end 16 feet east of centre of Fifty-second, west		6	16
Total			17,421
Fire hydrant connections		6	1,108
	Fire connections (private.)		
Academy street, south side 25 feet west of west house line of Tenth; Arch Street Opera House		4	6
Broad street, west side 107 feet south of south house line of Walnut; Stratford Hotel		4	11
Delaware avenue, east side 30 feet south of south house line of Vine, on Pier No. 15, Pennsylvania Railroad		4	37
Elm street, south side 50 feet east of east house line of Forty-eighth; for Pennsylvania Railroad Company		6	20
Filbert street, north side 50 feet east of east house line of Twenty-first; for Pennsylvania Railroad Company		4	19
Haverford avenue, south side 35 feet 6 inches west of west house line of Sixty-ninth; for C. M. Brown & Co		4	18
Library street, north side 72 feet east of east house line of Fifth; for A. J. Drexel		6	15
Total			126
	Supply connections (private).		
Girard avenue, south side, 132 feet east of east house line of Thirty-eighth, for Robert Smith Brewing Company		4	26
	Drains.		
Belmont Station, 5 feet 2 inches northwest of boiler-house		6	18
Chestnut street, north side, 156 feet west of west house line of Fifteenth, from fire-hydrant connection		4	6
Third street, from fire-hydrant connection in vault of No. 130 North Third street, into sewer		3	19
Total			43

Street. Location.	Size in inches.	Distance in feet.
Pipe relaid.		
Academy street, from centre of Tenth, west	6	57
Albion street, from centre of Cherry, north	6	24
Ann street, from centre of Eighteenth, to west house line of Nineteenth	6	473
Benton street, from north house line of Melloy, to 24 feet 6 inches south of centre of Market	6	313
Buckley street, from centre of Fifth, to centre of Sixth	6	449
Chestnut street, from 16 feet 4½ inches east of centre of Twenty-third, west	10	21
Claymont street, from centre of Cherry, north	6	27
Currant alley, from 8 feet north of centre of Spruce, to centre of Locust	6	441
Cypress street, from centre of Third, to centre of Fourth	6	446
Elwyn street, from centre of Cherry, north	6	208
Friedlander street, from centre of Cherry, north	6	23
Girard avenue, from 73 feet west of west house line of Eleventh, to centre of Twelfth	6	350
Griscom street, from centre of Pine, to centre of Spruce	6	524
Hunter street, from centre of Tenth, west	6	30
Jacoby street, from centre of Cherry, to centre of Race	6	333
Jacoby street, from 99 feet 3 inches north of centre of Race, to centre of Monterey	6	337
Juvenal street, from centre of Sansom, to centre of Medical	6	141
Medical street, from 6 feet 5 inches west of centre of Tenth, to centre of Juvenal	6	307
Monterey street, from centre of Twelfth, to centre of Thirteenth	6	454
Shoemaker street, from 184 feet east of centre of Eighth, west	6	184
Twenty-third street, from 94 feet south of south house line of Market, north	12	119
Total		5,261
Fire connections (private) relaid.		
Eighteenth and Race streets, in yard of Roman Catholic Cathedral	4	44
Fire-hydrant connections relaid	6	463
Repairs, general	3	30
" "	4	28
" "	6	600
" "	8	74
" "	10	65
" "	12	63
" "	20	10
Total		870

Street. Location.	Size in inches.	Distance in feet.
Pipe taken up.		
Albion street, from centre of Cherry, north	3	24
Ann street, from centre of Eighteenth to west house line of Nineteenth	3	468
Benton street, from north house of Melloy to 24 feet. 6 inches south of centre of Market	3	313
Buckley street from centre of Fifth to centre of Sixth	3	446
Chestnut street, from 16 feet 4 inches east of centre of Twenty-third, west	6	21
Claymont street, from centre of Cherry, north	3	27
Currant alley, from 8 feet north of centre of Spruce to centre of Locust	3	441
Cypress street, from centre of Third to centre of Fourth	3	446
Elwyn street, from centre of Cherry, north	3	208
Friedlander street, from centre of Cherry north	3	23
Girard street, from 73 feet west of west house line of Eleventh to centre of Twelfth	4	415
Griscom street, from centre of Pine to centre of Spruce	3	545
Hunter street, from centre of Tenth, west	3	6
Jacoby street, from centre of Cherry to centre of Race	3	290
Jacoby street, from 99 feet 3 inches north of centre of Race to centre of Monterey	3	350
Juvenal street, from centre of Sansom to centre of Medical	3	141
Medical street, from 5 feet 6 inches west of centre of Tenth to centre of Juvenal	3	307
Monterey street, from centre of Twelfth to centre of Thirteenth	3	446
Shoemaker street, from 184 feet east of centre of Eighth, west	1½	149
Twenty-third street, from 94 feet south of south house line of Market, north	4	115
Total		5,181
Fire hydrant connections taken up	3	99
" " "	4	562
" " "	6	19
Total		680
Pipe lowered.		
Fifty-third street, from north house line of Westminster avenue to centre of Wyalusing	6	474
Wyalusing avenue, from centre of Fifty-third, west	6	15
Total		489

Street.	Location.	Size in inches.	Distance in feet.
	Pipe cut off and abandoned.		
Academy street,	from centre of Tenth, west	3	57
Hunter street,	from 6 feet west of centre of Tenth street, west	3	24
Shoemaker street,	from 35 feet east of centre of Eighth, west	1½	35
	Total		116
	Fire connections (private) cut off and abandoned.		
Eighteenth and Race streets,	in yard of Roman Catholic Cathedral	3	44
Fire hydrant connections cut off and abandoned		3	69
" " " "		4	333
	Total		402

Recapitulation of Second District.

	Purposes for which used.	Size—Inches. 1½	3	4	6	8	10	12	20	Totals in feet and pounds.
New pipe or feet added.	Service mains				15,167	1,787	271	196		17,421
	Fire-hydrant connections				1,108					1,108
	Fire connections (private)			91	35					126
	Supply connections (private)			26						26
	Drains		19	6	18					43
	Total... feet		19	123	16,328	1,787	271	196		18,724
	Total... pounds		285	2,337	538,824	75,054	14,905	14,112		645,517
Pipe used, but adding nothing to feet in the ground.	Pipe relaid			44	5,584		21	119		5,744
	Repairs general		30	28	600	74	65	63	10	870
	Pipe taken up	149	4,580	1,092	40					5,861
	Pipe lowered				489					489
	Total... feet	149	4,610	1,164	6,713	74	86	182	10	12,988
	Total... pounds	1,043	69,150	22,116	221,529	3,108	4,730	13,104	1,590	336,370
	Total handled... feet	149	4,629	1,287	23,011	1,861	357	378	10	31,712
	Total handled... pounds	1,043	69,435	24,453	760,353	78,162	19,635	27,216	1,590	981,887
	Pipe cut off and abandoned	35	195	402						632

Third District.

Comprising the Eleventh, Twelfth, Sixteenth, Seventeenth, Eighteenth, Nineteenth, Twenty-third, Thirty-first, and part of the Twenty-fifth Wards.

Street. Location.	Size in inches.	Distance in feet.
Service Mains.		
Amber street, from dead end, 552 feet northeast of northeast house line of Westmoreland, to 366 feet 9 inches uortheast of northeast house line of Ontario	6	600
Beaver street, from Third to Charlotte	6	237
Berks street, from 35 feet 5 inches east of west house line of Front, to 28 feet 2 inches west of west house line of Howard	6	306
Bley street, from dead end, 3 feet 6 inches northeast of southwest house line of Clearfield, northeast	6	28
Church street, from Adams to Leiper	6	351
Church street, from 7 feet southeast of centre of Tacony road, northwest	6	7
Clearfield street, from centre of Jasper, northwest	6	177
Denver street, from Boudinot, to "D"	6	275
Elizabeth street, from centre of Church, northeast, to connect dead end	6	22
Elkhardt street, from 182 feet 2 inches east of centre of Melvale, west	6	182
Evans street, from Hull, to Clearfield	6	527
Fairhill street, from centre of Pike, to 12 feet north of north house line of Luzerne	6	537
Fillmore street, from 378 feet 7 inches southeast of southeast house line of Frankford avenue, northwest	6	400
Fisher street, from Wellington to Westmoreland	6	407
Fremont street, from Ormes, to Leamy	6	206
Geisler street, from Belgrade, to Miller	6	175
Henderson street, from centre of Philip, to east house line of American	6	139
Hope street, from Master to Jefferson	6	453
Howell street, from south house line of Church, north	6	26
Imogene street, from Penn to Leiper	6	323
James street, from dead end, 301 feet northeast of northeast house line of Orthodox, to centre of Margaretta	6	242
Janney street, from south to north house line of Ontario	6	64
Jasper street, from 293 feet southwest of centre of Somerset, northeast	6	293
Kirkbride street, from centre of Church, north	6	25
Lesher street, from 25 feet south of centre of Meadow, north	6	25
Livingstone street, from 193 feet southwest of southwest house line of Allegheny avenue, northeast	6	231
Margaretta street, from Cedar to Frankford road	6	459
Marshall street, from 12 feet 8 inches south of centre of Tioga, north	6	398

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains—Continued.		
Mascher street, from dead end, 87 feet south of south house line of Montgomery avenue, to centre of Berks		6	678
Meadow street, from Hedge to Paul		6	684
Meighan street, from 458 feet southeast of southeast house line of Kensington avenue, northwest		6	480
Montgomery avenue, from east to west curb liue of Mascher		6	26
Ninth street, from 27 feet south of north house line of Lehigh avenue, north, to connect dead end		6	28
Ninth street, from dead end, 3 feet north of south house line of Somerset, to 9 feet north of south house line of Cambria		6	559
Ontario street, from 1 foot 10 inches east of east house line of Tulip, to centre of Amber		8	1,207
Ontario street, from 327 feet east of centre of Glenwood avenue, west		6	327
Penn street, from southwest curb line of Oxford pike, to centre of Harrison		6	472
Pike street, from centre of Fifth, to west house line of Sixth		6	588
Randolph street, from dead end, 23 feet 6 inches north of south house line of Girard avenue, north		6	55
Reese street, from centre of Pike, north		6	531
Rodgers street, from Pegg to Crooked place		6	142
Ross street, from Ireland to Rihl		6	245
Salmon street, from 27 feet south of centre of Kirkbride, north		6	27
School street, from 22 feet south of centre of Church, north		6	22
Sixth street, from south curb line of Pike, to 12 feet north of south house line of Luzerne		12	554
St. Bernard street, from centre of Philip, to east house line of American		6	140
Summer street, from dead end, 22 feet south of centre of Fremont, north		6	22
Tioga street, from centre of Second, to east house line of Philip		6	140
Tioga street, from west house line of Sixth, to west house line of Marshall		6	237
Trenton avenue, east side, from south to north house line of Ontario		6	64
Trenton avenue, west side, from south to north house line of Ontario		6	64
Tulip street, from south to north house line of Ontario		6	64
Tuscullum street, from centre of Garnet, northwest		6	134
Virginia street, from 121 feet 3 inches east of centre of Amber, west		6	121
Washington street, from 23 feet south of centre of Church, north		6	23
Waterloo street, from south to north house line of Ontario.		6	64
Weikel street. from south to north house line of Ontario		6	64

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains—Continued.		
Weisser street, from Thompson to Almond		6	347
Wildey street, from 5 feet southwest of southwest house line of Susquehanna avenue, northeast		6	39
Willigs avenue, from centre of Palmer, southwest		6	165
Willow street, from centre of Meadow, north		6	27
Witte street, from 32 feet south of centre of Ontario, north.		6	32
Young street, from centre of Church, north		6	23
Total			15,510
	Supply Mains.		
Fifth street, below Bristol avenue, on bridge		30	35
	Service Main Connections.		
Sixth street, intersection of Columbia avenue, between 4 inch main on east and west side of Sixth, 6 feet 7 inches north of south house line of Columbia ave		6	15
Third and Norris, between 6 inch main on Norris and 6 inch main on Third street		6	10
Total			25
	Supply Main Connections.		
Fifth and Norris streets, between 18 inch main on Norris and 6 inch main on Fifth		10	36
Fifth street and Susquehanna avenue, between 6 inch main on Fifth and 18 inch main on Susquehanna avenue		8 10	2 39
Hancock and Norris streets, between 18 inch main on Norris and 6 inch main on Hancock		10	32
Hancock street and Susquehanna avenue, between 6 inch main on Hancock and 18 inch main on Susquehanna		8 10	7 32
Howard street and Susquehanna avenue, between 6 inch main on Howard and 18 inch main on Susquehanna		8 10	3 36
Lawrence street and Susquehanna avenue, between 6 inch main on Lawrence and 18 inch main on Susquehanna		8 10	4 32
Lehigh avenue, 201 feet 3 inches west of west house line of Sixth, to connect 20 inch supply main on Lehigh with 36 inch reservoir connection		16 20	52 11

Street. Location.	Size in inches.	Distance in feet.
Service Mains—Continued.		
Mascher and Norris streets, between 18 inch main on Norris and 6 inch main on Mascher	10	30
Mascher street and Susquehanna avenue, between 6 inch main on Mascher and 18 inch main on Susquehanna	6	41
Third street and Susquehanna avenue, between 6 inch main on Third and 18 inch mainon Susquehanna	8 10	13 40
Total		410
By-pass connections.		
Devereaux street, 21 feet west of west fence line of Bustleton pike	6	14
Frankford station, 1,317 feet north of trestle work on 30-inch main	6	17
Total		31
Fire hydrant connections	6	2,157
Fire Connections (private).		
Beach street, east side, 231 feet 6 inches south of south house line of Laurel; for Kugley, Bickley & Fields	4	8
Church street, northeast side, 233 feet 9 inches north-east of north-east house line of Trenton avenue, for Berkshire Mfg. Co	4	20
Dauphin street, south side, 27 feet 6 inches west of west house line of Amber; for David Sykes	4	18
Diamond street, north side, 118 feet east of northeast house line of Germantown avenue; for Boyer Bros	4	23
Division street, south side, 32 feet east of east house line of Mercer; for Harold R. Lewis & Co	4	14
Randolph street, west side, 198 feet south of south house line of Montgomery avenue; for McNeely & Sons	4	21
Randolph street, west side, 59 feet south of south house line of Montgomery avenue; for Blessing & Co	4	22
Tioga street, south side, 91 feet 2 inches west of west house line of Trenton avenue; for Thomas Henry & Son	4	20
Trenton avenue, northwest side, 30 feet northeast of north-east house line of Rush; for James Wright	4	13
Total		159

Street. Location.	Size in inches.	Distance in feet.
Drains.		
Church street, south side, 221 feet 9 inches west of west house line of Tacony	4	15
	6	5
Frankford Station, 364 feet 7 inches north of engine house, from 30-inch main	6	20
Kensington pike, southwest side of Rock creek (extension), from 30-inch main	6	61
Laurel street, norfh side, 95 feet west of west house line of Canal	4	24
Mascher street, intersection of Susquehanna avenue, from 6-inch supply main connection	6	6
Total		131
New check valve.		
Wentz Farm Reservoir, on 30-inch pumping main	30	11
Pipe relaid.		
Chatham street, from centre of Buttonwood, north	6	27
Hope street, from south house line of Berks, north	6	59
Jasper street, from Madison avenue to Wellington	6	42
Julianna street, from Callowhill to Willow	6	195
Madison avenue, from 12 feet east of centre of Jasper, west	6	12
Randolph street, from 10 feet south of south house line of Girard avenue, north	6	34
Randolph street, from 24 feet 9 inches south of north house line of Girard avenue to Thompson	6	418
Randolph street, from 10 feet 8 inches south of north house line of Master, north	6	36
Total		823
Fire hydrant connections relaid	6	318
Repairs, general	4	5
" "	6	983
" "	8	40
" "	10	50
" "	12	13
" "	16	9
" "	30	30
Total		1,130

Street. Location.	Size in inches.	Distance in feet.
Pipe taken up.		
Chatham street, from centre of Buttonwood, north	6	27
Hope street, from south to north house line of Berks	4	59
Jasper street, from Madison avenue to Wellington	6	40
Madison avenue, from 7 feet east of centre of Jasper street, west	6	7
Randolph street, from 10 feet 8 inches south of south house line of Master, north	4	36
Total		169
Fire hydrant connections taken up	4	360
" " "	6	27
Total		387
Pipe lowered.		
Church street, from intersection of Tacony road, west	6	543
Fifth street, from 212 feet south of north house line of Pike, north	30	190
Tacony street, from 674 feet southwest of Church, northeast	6	1,076
Total		1,809
Pipe raised.		
Leamy street, from centre of Tuscullum, north	6	157
Ormes street, from centre of Somerset, north	6	64
Somerset street, from 144 feet east of centre of Ormes, west	6	191
Tuscullum street, from 160 feet northwest of northwest house line of C street, northwest	6	779
Total		1,191
Pipe cut off and abandoned.		
Julianna street, from Callowhill to Willow	3	180
Fire hydrant connections cut off and abandoned	4	732
" " " "	6	80
Total		812

Recapitulation of Third District.

	Purposes for which used.	Size—Inches. 3	4	6	8	10	12	16	20	30	Totals in feet and pounds.
New pipe or feet added.	Service mains			13,749	1,207		554				15,510
	Supply mains									35	35
	Service main connections			25							25
	Supply main connections			41	29	277		52	11		410
	Bye-pass connections			31							31
	Fire-hydrant connections			2,157							2,157
	Fire connections (private)		159								159
	Drains		39	92							131
	New check valve									11	11
	Total... feet		198	16,095	1,236	277	554	52	11	46	18,469
	Total... pounds		3,762	531,135	51,912	15,235	39,888	5,720	1,749	15,272	664,673
Pipe used, but adding nothing to feet in the ground.	Pipe relaid			1,141							1,141
	Repairs general		5	983	40	50	13	9		30	1,130
	Pipe taken up		455	101							556
	Pipe lowered			1,619						190	1,809
	Pipe raised			1,191							1,191
	Total... feet		460	5,035	40	50	13	9		220	5,827
	Total... pounds		8,740	166,155	1,680	2,750	936	990		73,040	254,291
	Total handled... feet		658	21,130	1,276	327	567	61	11	266	24,296
	Total handled... pounds		12,502	697,290	53,592	17,985	40,824	6,710	1,749	88,312	918,964
	Pipe cut off and abandoned	180	732	80							992

Fourth District.

Comprising the Thirteenth, Fourteenth, Fifteenth. Twentieth, Twenty-ninth, and part of the Twenty-eighth Wards.

Street. Location.	Size in inches.	Distance in feet.
Service Mains.		
Albrecht street, from west house line of Twenth-eighth west	6	110
Allegheny avenue, south side, from centre of Seventeenth west	6	425
Allegheny avenue, south side, from 30 feet east of west house line of Twenty-second west	6	230
Arizona street, from 35 feet east of west house line of Twenty-ninth, to east house line of Thirtieth	6	435
Atlantic street, from 26 feet north of south house line of Susquehanna avenue north	6	37
Baltz street, from dead end 134 feet west of west house line of Thirtieth to Thirty-first	6	291
Beacon street, from Columbia avenue to Montgomery ave	6	563
Bishop street, from west house line of Thirteenth to Park avenue	6	233
Bouvier street, from Susquehanna avenue north to connect dead end	6	35
Carlton street, from dead end 4 feet 9 inches west of east house line of Twenty-second west	6	27
Clarence street, from Twelfth to Thirteenth	6	461
Cleveland avenue, from Norris to Fontaine	6	326
Como street, from Germantown avenue to Eleventh	6	418
Cumberland street, from 29 feet west of east house line of Broad west	12	48
Coffman street, from 8 feet 3 inches east of west house line of Thirteenth to centre of Park avenue	6	241
Dauphin street, from dead end 2 feet west of east house line of Sixteenth to centre of Colorado	6	628
Dauphin street, from centre of Bouvier to 1 foot west of east house line of Eighteenth	6	134
Diamond street, north side, from dead end 7 feet 4 inches east of west house line of Seventeenth to Eighteenth	6	427
Diamond street, south side, from dead end 64 feet 8 inches west of west house line of Gratz to dead end 23 feet east of east house line of Uber	6	352
Diamond street, north side, from east house line of Nineteenth to 19 feet 6 inches west of east house line of Twentieth	6	468
Diamond street, north side, from 10 feet 6 inches east of centre of Marston, to west house line of Twenty-eighth.	6	200
Diamond street, north side, from 1 foot 6 inches west of east house line to 1 foot 6 inches east of west house line of Harrison	6	27
Dover street, from Stiles north to connect dead end	6	66

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains—Continued.		
Edgely street, from Seventeenth to Eighteenth		6	446
Engleside street, from Parrish to Poplar		6	459
Etting street, from 176 feet 5 inches southeast of southeast house line of Sedgely avenue northwest		6	207
Fawn street, from centre of Dauphin north		6	235
Fairmount avenue, from dead end 18 feet 10 inches west of east house line of Twenty-second west		10	8
Fontaine street, from Eighteenth to Nineteenth		6	460
French street, from Seventeenth to Eighteenth		6	446
Gratz street, from Norris to Fontaine		6	324
Gratz street, from centre of Fontaine north, to connect dead end		6	20
Hagert street, from Twenty-sixth to Twenty-seventh		6	453
Harrison street, from Diamond to Susquehanna avenue		6	552
Harrold street, from east house line of Thirteenth west, to connect dead end		6	30
Harrold street, from 1 foot 2 inches east of west house line of Twenty-fifth to centre of Twenty-seventh		6	876
Helm street, from south house line of Indiana avenue north		6	28
Huntingdon street, from east house line of Thirteenth west to connect dead end		6	55
Huntingdon street, from 6 feet east of east house line of Broad west		6	37
Huntingdon street, from 31 feet west of east house line of Broad west		12	49
Indiana avenue, from east house line of Thirty-fifth west		6	64
Lambert street, from dead end 1 foot 6 inches north of south house line of Susquehanna avenue, to south house line of Dauphin		6	589
Lehigh avenue, south side, from 310 feet east of east house line of Twenty-seventh, to 1 foot west of east house line of Twenty-eighth		6	713
Linda street, from Germantown avenue to Eleventh		6	417
*Lisbon street, from north house line of Clearfield, to south house line of Park		6	230
Logan street, from 25 feet 8 inches east of east house line of Thirteenth, to dead end 1 foot west of east house line of Park		6	230
Maple avenue, from 33 feet south of north house line of Susquehanna avenue, north		6	469
Marston street, from Diamond to Susquehanna		6	572
Meredith street, from dead end, 162 feet west of west house line of Twenty-fifth to Twenty-sixth		6	271
Newkirk street, from Stiles, north, to connect dead end		6	99
Nineteenth street, from Norris to Diamond		6	537
Nineteenth street, from Diamond to Susquehanna		6	546

*Connected to private pipe on Park street, between Seventeenth and Lisbon streets.

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains—Continued.		
Oakdale street, from centre of Twelfth, west		6	212
Ontario street, from 44 feet 7 inches south of north house line of Girard avenue, north		6	47
Page street, from Nineteenth, west, to connect dead end		6	19
Page street, from dead end, 138 feet 6 inches west of west house line of Twenty-ninth, west		6	121
Park street, from 30 feet east of west house line of Seventeenth, west		6	404
Park street, from 30 feet east of west house line of Twenty-second, west		6	230
Park avenue, from dead end, 21 feet 2 inches south of south house line of Bishop, to 3 feet south of north house line of Coffman		6	179
Philadelphia street, from Susquehanna to Dauphin		6	588
Pomroy street, from Fifteenth to Philadelphia		6	232
Poplar street, from 22 feet 3 inches west of east house line of Twenty-second, west, to connect dead end		6	37
Sargeant street, from 322 feet 10 inches east of east house line of Thirteenth, west		6	350
Sartain street, from Cumberland to Huntingdon		6	550
Seventeenth street, from 21 feet south of north house line of Susquehanna to York		6	1,127
Seventeenth street, from north house line of Clearfield, to Allegheny avenue		6	543
Showaker street, from 310 feet east of east house line of Twenty-seventh, west		6	336
Sixteenth street, from Dauphin, north, to connect dead end		6	35
Sommerville street, from east house line of Twelfth, west		6	25
Susquehanna avenue, from Sixteenth to Seventeenth		6	444
Susquehanna avenue, from Colorado to Eighteenth		6	301
Thirteenth street, from 168 feet 2 inches south of south house line of Sargent, to Lehigh avenue		6	1,022
Thirty-fifth street, from Indiana, to south house line of Allegheny avenue		6	1,032
Thirty foot street, from 211 feet south of south (475 feet west of Broad) house line of Indiana avenue, north		6	239
Tivoli street, from Germantown avenue to Eleventh		6	419
Tucker street, from east house line of Thirteenth, west, to connect dead end		6	28
Twelfth street, from north house line of Cumberland, to dead end 10 feet north of centre of Clarence		6	391
Twelfth street, from Lehigh to Somerset		6	573
Twenty-eighth street, from Diamond to Susquehanna		6	552
*Twenty-fifth street, from Spring Garden to Brandywine		6	225
Twenty-ninth street, from dead end 3 feet south of north house line of Thompson to Master		8	453

*This pipe replaces that formerly laid in centre (old line) of Twenty-fifth street, which was taken up in 1886 during the construction of the Baltimore and Ohio Railroad Tunnel.

Street. Location.	Size in inches.	Distance in feet.
Service Mains—Continued.		
Twenty-second street, from 23 feet 6 inches south of north house line of Fairmount avenue, north, to connect dead end	10	7
Twenty-seventh street, from dead end, 1 foot north of south house line of Lehigh avenue, north	6	35
Twenty-sixth street, from Harrold to Harrold	6	30
Waldron street, from centre of Thirtieth, west	6	362
Westmont street, from Twenty-ninth to Thirtieth	6	460
Willington street, from 26 feet north of south house line of Susquehanna, north	6	38
Willington street, from 274 feet 6 inches south of south house line of Dauphin, north	6	300
Woodstock street, from dead end 14 feet north of south house line of Susquehanna, to south house line of Dauphin	6	576
York street, from 10 feet east of east house line of Broad west	6	39
Total		28,165
Supply Mains.		
Fairmount avenue, south side, from centre of Twentieth street to 62 feet 6 inches west of west house line of Twenty-second	16	1,094
Spring Garden Station, from dead end intersection of 36 and 48 inch supply main north of standpipe to northwest side of Connecting Railroad	36	199
Spring Garden Station, from southeast to northwest side of Connecting Railroad north of standpipe	48	148
Total		1,441
Pumping Mains.		
Spring Garden Station, from dead end, 63 feet northwest of 48-inch stop on No. 7 main (Stand Pipe Hill), to East Park Reservoir	48	1,853
Spring Garden Station, from 89 feet north of 48-inch stop on No. 7 main, northwest across Connecting Railroad for No. 11 Pumping Station	48	102
Total		1,955

Street. Location.	Size in inches.	Distance in feet.
Service Main connections.		
Ridge avenue, intersection of Buttonwood, between 6-inch pipe on Ridge avenue and 6-inch pipe on Buttonwood	6	12
Sixth street, 19 feet south of north house line of Norris, between 4-inch main on east side and 4-inch main on west side of Sixth	6	14
Sixth street, 18 feet north of south house line of Diamond, between 4-inch main on east side and 4-inch main on west side of Sixth	6	14
Total		40
Supply Main connections.		
Fairmount avenue, 61 feet 4 inches west of west house line of Twenty-second, between 10 inch main on north side and 30-inch main on south side of Fairmount avenue	10	13
Germantown avenue, northwest corner of Susquehanna avenue, between 18-inch main on Germantown avenue and 20-inch main on Susquehanna avenue	20	64
Lehigh avenue, 203 feet west of west house line of Twelfth street, between 30-inch main on the south side and 6-inch main on the north side of Lehigh avenue	6	9
Nineteenth and Callowhill streets, between 10-inch main on Nineteenth and 22-inch main on Callowhill	10	38
Oxford and Twenty-second streets, between 30-inch main on north side and 6-inch main on south side of Oxford	6	9
Poplar street, 339 feet east of east house line of Twenty-second, between the centre and south 30-inch mains	30	40
Poplar street, intersection of Twenty-second, between 48-inch main on Poplar and 30-inch main on Twenty-second	30	51
Poplar and Twenty-second streets, between 6 and 12 inch mains on Twenty-second	6	8
Twenty-first and Callowhill streets, between 10-inch main on Callowhill and 22-inch main on Twenty-first	10	40
Twenty-first street, 53 feet north of the south house line of Shamokin, between 6 and 22 inch mains on Twenty-first	6	7
Twenty-first street, south house line of Pennsylvania avenue, between 6 and 22 inch mains on Twenty-first	6	9
Twenty-second street and Pennsylvania avenue, between 6-inch main on Twenty-second street and the 22-inch main on Pennsylvania avenue	10	14
Total		

Street. Location.	Size in inches.	Distance in feet.
Pumping Main connections.		
Stand Pipe Hill, Spring Garden Station, northeast of standpipe, between 48-inch or No. 7 main and Belmont supply main	30	34
Stand Pipe Hill, Spring Garden Station, between 48-inch or No. 7 main to Belmont supply main	30	23
Stand Pipe Hill, Spring Garden Station, southwest of standpipe, between No. 8 and No. 11 pumping mains	30	42
Total		401
Bye-pass connections.		
Brandywine street, from 5 feet east of east house line of Twentieth to 5 feet west of west house line, on 4-inch main, north of centre	6	65
Cumberland and Broad streets, south of 12-inch pipe	6	23
Dauphin and Broad streets, south of 10-inch pipe	8	37
Eighteenth and Callowhill streets, between 20-inch main on Callowhill and 6-inch main on Eighteenth	6	43
Fairmount avenue and Twenty-first street, between 6-inch main on Twenty-first and 10 inch main on Fairmount avenue	6	53
Fifteenth and Callowhill streets, between 20-inch main on Callowhill and 6-inch main on Fifteenth	6	42
Green street, from 18 feet west of east house line of Twentieth to 12 feet west of west house line, on 6-inch main, north of centre	6	50
Huntingdon and Broad streets, south of 12-inch pipe	6	23
Sixteenth and Callowhill streets, between 20-inch on Callowhill and 20-inch main on Sixteenth	6	29
Seventeenth and Callowhill streets, between 20-inch main on Callowhill and 6-inch main on Seventeenth	6	39
Twentieth and Callowhill streets, between 6-inch main on Twentieth and 20-inch main on Callowhill	6	39
Twenty-second and Spring Garden streets, between 6 and 10-inch mains on Twenty-second, north and south of centre of Spring Garden	6	22
Twenty-second and Callowhill streets, between 6-inch main on Callowhill and 12-inch main on Twenty-second	12	39
Wallace street, from 1 foot 8 inches east of east house line of Twentieth to 7 feet 8 inches west of west house line of Twentieth on 6-inch main, south of center	6	64
York and Broad streets, south of 10-inch pipe,	6	18
Total		586
Fire Hydrant connections	6	2,487

Street. Location.	Size in inches.	Distance in feet.
Fire connections (private).		
Nevada street, south side, 28 feet east of east house line of Eleventh, for Carey & Bro.	4	15
Pennock street, west side, 93 feet 6 inches north of north house line of Parrish, for Powell & Bro.	4	14
Total		29
Supply connections (private).		
Cambridge street, north side, 175 feet east of east house line of Seventeenth, for St. Joseph's Hospital.	2	
Eighteenth street, west side, 209 feet north of north house line of Diamond, for Memorial P. E. Church.	2	
Fairmonnt avenue, north side, 132 feet west of west house line of Twenty-first, for Eastern Penitentiary.	4	20
Pennock street, west side, 95 feet 6 inches north of north house line of Parrish, for Powell & Bro.	2	
Ridge avenue, southwest side, 60 feet 6 inches northwest of west house line of Thirty-second, for Public Bath.	4	11
Total		31
Drains.		
Broad street, west side, 2 feet 6 inches north of north house line of York, from five hydrant connection.	6	44
East Park Reservoir, 17 feet south of Montgomery avenue north.	10	52
East Park Reservoir, draw off in stop-house opposite Montgomery avenue.	4	4
Fairmount avenue, 171 feet east of east house line of Twenty-first, from 10-inch main.	4	2
Fairmount avenue, south side, 149 feet 5 inches east of east house line of Twenty-first, from 16-inch main.	6	7
Sixteenth street, intersection of Callowhill, from bye-pass connection.	6	4
Spring Garden station, 72 feet 6 inches northeast of No. 8 Engine House.	10	28
Susquehanna avenue, intersection of Twelfth, from 6-inch main.	6	8
Thirtieth street, 13 feet south of north house line of Fletcher, from 12-inch main.	6	5
Total		154
New Check Valve.		
Spring Garden station, on 30-inch connection northeast of stand pipe, between No. 7 and Belmont main.	30	

Street.	Location.	Size in inches.	Distance in feet.
	Pipe relaid.		
Brandywine street,	from dead end, 6 feet west of east house line of Twenty-fifth, west	6	25
Callowhill street,	from east to west house line of Marshall	6	68
Capitol street,	from 27 feet south of the centre of Parrish, north	6	27
Girard avenue,	north side, from the centre of Sixth, to 3 feet 3 inches west of east house line of Eighth	6	944
Ontario street,	from Poplar to Girard avenue	6	456
Spring Garden Station,	56 feet north of engine house (drain)	16	10
Spring Garden Station,	84 feet 6 inches northeast of No. 7 engine house on No. 8 distributing main	30	49
West street,	from 27 feet 6 inches south of the centre of Parrish, north	6	28
Spring Garden street,	from dead end 6 feet east of east house line of Twenty-fifth, west	6	32
	Total		1,639
Repairs, general		3	8
" "		4	55
" "		6	1,608
" "		8	7
" "		10	112
" "		12	126
" "		16	7
" "		20	48
" "		30	91
" "		36	18
" "		48	45
	Total		2,125
	Pipe taken up.		
Berks street,	from 180 feet east of east house line of Seventeenth, west	6	23
Capitol street,	from 27 feet south of the centre of Parrish, north	4	27
Ontario street,	from Poplar to Girard avenue	4	456
Spring Garden Station,	disconnected 36-inch connection from EastPark, 48-inch supply main, east of Connecting Railroad	36	24
Spring Garden Station,	drain pipe	20	9
Spring Garden Station,	84 feet 6 inches northeast of No. 7 engine house on No. 8 distributing main	30	49

Street.	Location.	Size in inches.	Distance in feet.
	Pipe taken up—Continued.		
Spring Garden Station, 49 feet north of No. 7 engine house, on old No. 6 36-inch main		36	38
West street, from 27 feet 6 inches south of the centre of Parrish, north		4	27
Total			653
Fire-hydrant connections taken up		4	116
" " " "		6	10
Total			126
	Pipe cut off and abandoned.		
Callowhill street, north side, 3 feet west of east house line of Marshall, west		4	44
Girard avenue, north side, from Sixth to Eighth		4	929
Fire-hydrnat connections cut off and abandoned		4	1,102
" " " " "		6	32
Total			2,107

Recapitulation of Fourth District.

	Purposes for which used.	Size—Inches. 3	4	6	8	10	12	16	20	30	36	48	Totals in feet and pounds.
New pipe or feet added.	Service mains			27,600	453	15	97						28,165
	Supply mains							1,094			199	148	1,441
	Pumping mains											1,955	1,955
	Service main connections			40									40
	Supply main connections			42		105			64	91			302
	Pumping main connections									99			99
	Bye-pass connections			510	37		39						586
	Fire-hydrant connections			2,487									2,487
	Fire connections (private)		29										29
	Supply connections (private)		31	124									155
	Drains		6	68	80								154
	Total... feet		66	30,871	570	120	136	1,094	64	190	199	2,103	35,413
	Total... pounds		1,254	1,018,743	23,940	6,600	9,792	120,340	10,176	63,080	83,978	1,230,255	2,568,158
Pipe used, but adding nothing to feet in the ground.	Pipe relaid			1,725				10		49	24		1,808
	Repairs general	8	55	1,608	7	112	126	7	48	91	18	45	2,125
	Pipe taken up		626	33					9	49	62		779
	Total... feet	8	681	3,366	7	112	126	17	57	189	104	45	4,712
	Total... pounds	120	12,939	111,078	294	6,160	9,072	1,870	9,063	62,748	43,888	26,325	283,557
	Total handled... feet	8	747	34,237	577	232	262	1,111	121	379	303	2,148	40,125
	Total handled... pounds	120	14,193	1,129,821	24,234	12,760	18,864	122,210	19,239	125,828	127,866	1,256,580	2,851,715
	Pipe cut off and abandoned		2,075	32									2,107

Fifth District.

Comprising the Twenty-first and part of the Twenty-eighth Wards.

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains.		
Cedar street,	from centre of Terrace to 25 feet northeast of southwest house line of Manayunk avenue	6	511
Chestnut street,	from centre of Walnut to centre of Leverington avenue	6	270
Cresson street,	from centre of Dawson, northwest	6	201
Dexter street,	from centre of Lyceum avenue, northwest	6	486
Fleeson street,	from southwest house line of Tibben to dead end 354 feet southwest of southwest house line of Ridge avenue	6	598
Flemming street,	from centre of Roxborough avenue northwest to connect dead end	6	20
Freeland avenue,	from centre of Roxborough avenue, northwest	6	277
Hermit street,	from centre of Sharp to centre of Magnet	6	401
James avenue,	from dead end 201 feet 6 inches northeast of northeast house line of Houghton, northeast	6	48
Jefferson street,	from dead end southwest house line of Selig, northeast	6	50
Manayunk avenue,	from centre of Sumac, northwest	6	25
Manayunk avenue,	from southeast to northwest house line of Kalos	6	50
Manayunk avenue,	from 253 feet southeast of southeast house line of Cedar to centre of Penn	6	518
Manayunk avenue,	from 27 feet southeast of centre of Lyceum avenue, northeast	6	27
Martin street,	from 10 feet southwest of northeast house line of Manayunk avenue, northeast, to connect dead end	6	68
Mitchell street,	from centre of Martin, northwest	6	20
Mitchell street,	from southeast to northwest house line of Lyceum avenue	6	80
Pechin street,	from southeast house line of Penn to southeast house line of Roxborough avenue	6	584
Pechin street,	from 20 feet southeast of centre of Martin, northwest	6	20
Pechin street,	from southeast to northwest house line of Lyceum avenue	6	80
Penn street,	from 4 feet southwest of centre of Manayunk avenue to centre of Pechin	6	570
Rochelle street,	from dead end 640 feet 9⅞ inches northeast of northeast house line of Manayunk avenue to southwest curb line of Freeland avenue	6	67
Roxborough avenue,	from centre of Terrace street to 35 feet northeast of northeast house line of Flemming	6	258
Roxborough avenue,	from 147 feet 6 inches southwest of southwest house line of Freeland avenue to southwest house line of Mitchell street	6	421

Street. Location.	Size in inches.	Distance in feet.
Service Mains—Continued.		
Spencer street from southwest house line of Cresson to southwest curb line of Dobson	6	441
Spring street, from centre of Wood to centre of Green lane	6	685
Terrace street, from centre of Cedar, northwest	6	169
Terrace street, from centre of Grape, northwest	6	186
Thirty-third street, from dead end, 194 feet northwest of northwest house line of Bowman, northwest	6	117
Thirty-fifth street, from dead end, 134 feet northwest of northwest house line of Fairview avenue, northwest	6	111
Tibben street, from nortqwest house line of Fountain to centre of Fleeson	6	346
Total		7,705
Supply Mains.		
Ridge avenue, from 35 feet southeast, to 70 feet 6 inches northwest of centre of new bridge over Wissahickon creek (2 lines)	12 16	156 156
		312
Supply main connections.		
Ridge avenue, 8 feet southeast of southeast house line of Allegheny avenue, between 6-inch on northeast side, and 12-inch main on southwest side of Ridge avenue	10	25
Ridge avenue, 70 feet 6 inches northwest of centre of new bridge over Wissahickon creek, between 12 and 6-inch main on Ridge avenue	6	13
Roxborough basin, Ann street 38 feet horth of south wall of reservoir, from Manayunk main west, to 30-inch reservoir connection in cellar of engine house	20 30	62 23
Total		113
Fire-hydrant connections	6	222
Fire connections (private).		
Main street, southwest side, 12 feet southeast of northwest house line of Gay, for Thos. Carter	4	29
Main street, southeast side, 135 feet southwest of southwest house line of Main, for Manayunk Paper Company	6	9
River road, southwest side, 497 feet northwest of northwest house line of Fountain, for M. & W. H. Nixon	4	19
Total		57

Street.	Location.	Size in inches.	Distance in feet.
	Drains.		
Hemlock street,	intersection of Vicaris,	4	48
Roxborough Water Works,	through the centre of engine house	6	40
	Total		88
	Pipe relaid.		
Ridge avenue,	from 113 feet 6 inches southeast of centre of new bridge over Wissahickon creek, northwest	6	256
Fire hydrant connections relaid		6	71
Repairs, general		6	58
" "		12	5
" "		20	6
" "		30	8
	Total		77
	Pipe taken up.		
Wissahickon drive,	from centre of Ridge avenue, northeast	6	44
Wissahickon dam,	from southeast to northeast side of creek	6	256
Wissahickon bridle path,	from centre of Ridge avenue, northeast	6	37
	Total		337
Fire hydrant connections taken up		4	86
" " "		6	4
	Total		90
	Pipe lowered.		
Hemlock street,	from center of Righter, northeast	6	50
Manayunk avenue,	from 73 feet northeast of centre of Sumac, northwest	6	73
Righter street,	from 200 feet southeast of centre of Hemlock, northwest	6	200

Street.	Location.	Size in inches	Distance in feet.
Pipe lowered—Continued.			
Sumac street,	from northeast house line of Manayunk avenue to northeast house line of Ridge avenue	6	512
Thirty-fifth street,	from dead end 110 feet northwest of northwest house line of Fairview avenue, northwest	6	48
Total			883
Pipe shifted.			
Sumac street,	from 156 northeast of northeast house line of Freeland avenue, northeast	6	108
Pipe cut off and abandoned.			
Fire hydrant connections		4	36

Recapitulation of Fifth District.

	Purposes for which used.	Size—Inches. 4	6	10	12	16	20	30	Totals in feet and pounds.
New pipe or feet added.	Service mains		7,705						7,705
	Supply mains				156	156			312
	Supply main connections		13	25			62	13	113
	Fire-hydrant connections		222						222
	Fire connections (private)	48	9						57
	Drains	48	40						88
	Total... feet	96	7,989	25	156	156	62	13	8,497
	Total... pounds	1,824	263,637	1,375	11,232	17,160	9,858	4,316	309,402
Pipe used, but adding nothing to feet in the ground.	Pipe relaid		327						327
	Repairs general		58		5		6	8	77
	Pipe taken up	86	341						427
	Pipe lowered		883						883
	Pipe shifted		108						108
	Total... feet	86	1,717		5		6	8	1,822
	Total... pounds	1,634	56,661		360		954	2,656	62,265
	Total handled... feet	182	9,706	25	161	156	68	21	10,319
	Total handled... pounds	3,458	320,298	1,375	11,592	17,160	10,812	6,972	371,667
	Pipe cut off and abandoned	36							36

Sixth District.

Comprising the Twenty-second and part of the Twenty-fifth and Twenty-eighth Wards.

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains.		
Angle street,	from 30 feet 9 inches east of west house line of York road, west, to connect dead end	6	97
Atlantic street,	from centre of Eighteenth, west	6	24
Bloyd street,	from 26 feet southeast of northwest house line of Woodbine avenue, to 244 feet 4 inches northwest of southeast house line of Chelten avenue	6	392
Bouvier street,	from Venango to Pacific	6	250
Camac street,	from centre of Butler, north, to 13 feet north of south house line of Pike	6	538
Carpenter street,	from dead end, 381 feet 3 inches southwest of southwest house line of Cresheim road, to Germantown avenue	6	1,282
Chelten avenue,	from dead end, 34 feet 8 inches southwest of northeast house line of Willow avenue, to 25 feet 3 inches northeast of centre of Wilson	6	524
Chelten avenue,	from Wissahickon avenue to Bexley	6	357
Chestnut Hill avenue,	from Thirtieth, to Germantown avenue	6	2,193
Chew street,	from 29 feet 2 inches southeast of northwest house line of Chelten avenue, northwest, to dead end	6	705
Chew street,	from centre of Tulpehocken, to 18 feet northwest of southeast house line of Washington lane	6	539
Chew street,	from 5 feet 6 inches southeast of southeast house line of Horter, northwest, to centre of Church	12	410
Church street,	from centre of Chew, northeast, to connect dead end	6	35
Clothier street,	from 39 feet 7 inches southwest of northeast house line of Germantown avenue, northeast	6	240
Corr street,	from 6 feet east of east house line of Seventeenth street, west	6	31
Coulter street,	from centre of Morris, northeast, to dead end	6	320
Cresheim street,	from centre of Carpenter, northwest	6	25
Crittenden street,	from 25 feet southeast of centre of Roumfort avenue, northwest	6	50
Crowson street,	from 25 feet southeast of northwest house line of Horter, to 22 feet northwest of southeast house line of Church	6	380
Cumberland street,	from 19 feet 3 inches southeast of northwest house line of Coulter, northwest, to dead end	6	150
Duval street,	from 394 feet 8 inches southwest of southwest house line of Morton, northeast	6	423
Earlham street,	from centre of Pulaski, to Tacoma	6	339

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains—Continued.		
Fairfax street, from Price to Centre		6	335
Hancock street, from 25 feet 6 inches southeast of northwest house line of High, northwest, to southeast house line of Douglass		6	214
Hancock street, from 18 feet southeast of northwest house line of Walnut lane, to 16 feet 10 inches northwest of southeast house line of Herman		6	285
Hancock street, from 19 feet southeast of northwest house line of Washington lane, northwest, to centre of Pomona terrace		6	254
Harvey street, from 25 feet southwest of centre of Wayne, northeast		6	25
Henry street, from centre of Seymore, to centre of Manheim		6	534
Horter street, from 24 feet 11 inches southwest of northeast house line of Musgrove, to 40 feet 6 inches northeast of southwest house line of Chew		6	680
Itschner street, from centre of Nineteenth, west		6	333
Kenderton street, from centre of Tioga, north		6	25
Lehman street, from 111 feet 4 inches southwest of southwest house line of Wayne, northeast		6	151
Lehman street from centre of Wissahickon avenue, northeast, to dead end		6	175
Louden street, from 350 feet 6 inches southwest of southwest house line of Germantown avenue, northeast		6	370
Musgrove street, from 17 feet 6 inches southeast of centre of Sharpnack, northwest		6	18
Musgrove street, from dead end, 28 feet 11 inches southeast of centre of Horter, northwest		6	29
Musgrove street, from 19 feet 9 inches southeast of northwest house line of Pleasant, to centre of Gorgas		6	534
Mather street, from centre of Ontario, to centre of Tioga		6	553
Morris street, from Queen to Coulter		6	718
Mower street, from centre of Carpenter, northwest		6	25
Mt. Pleasant street, from dead end, 326 feet 6 inches southwest of southwest house line of Boyer, northeast		6	352
Nash street, from 13 feet 3 inches southeast of centre of Sharpnack, northwest		6	33
Newbold street, from 298 feet southeast of centre of Ruscomb, northwest		6	48
Nineteenth street, from Allegheny, to Westmoreland		6	572
Ontario street, from Sixteenth, west		6	448
Park avenue, from 25 feet south of centre of Tioga, north		6	25
Peale street, from 10 feet 11 inches southeast of centre of Penn, northwest		6	44
Pleasant street, from 25 feet southwest of northeast house line of Musgrove, northeast		6	338
Pomona terrace, from Hancock to Morton		6	221
Pulaski avenue, from Penn to Coulter		6	341

Street.	Location.	Size in inches.	Distance in feet.
	Service Mains—Continued.		
Roumfort avenue,	from dead end, 48 feet northeast of northeast house line of Ardleigh, to 5 feet 4 inches northeast of northeast house line of Crittenden	6	1,181
Seventeenth street,	from centre of Venango, to 25 feet 2 inches north of south house line of Erie avenue	6	562
Sharpnack street,	from 4 feet 6 inches northeast of southwest house line of Chew, northeast	6	17
Smedley street,	from Westmoreland to Ontario	6	549
Stenton avenue,	from 5 feet northwest of northwest house line of Costello, to 72 feet northwest of southeast house line of Godfrey	6	1,936
St. Vincent place,	from 150 feet southwest of southwest house line of Chew, northeast	6	187
Tacoma street,	from centre of Coulter, to 32 feet 3 inches northwest of southeast house line of Earlham	6	170
Tioga street,	from 21 feet 1 inch east of southwest house line of Germantown avenue, to 36 feet west of east house line of Broad	6	563
Thirteenth street,	from centre of Butler to south house line of Pike	6	525
Thirty-first street,	from centre to northwest house line of Willow Grove avenue, to supply private pipe	6	31
Thirty-first street,	from northwest house line of Willow Grove avenue northwest, 6 inch, 445 feet (private pipe laid by H. H. Houston)		
Twentieth street,	Westmoreland to Ontario	6	550
Twenty-second street,	from centre of Park to 19 feet north of south house line of Westmoreland	6	890
Twenty-third street,	from southeast house line of Hartwell avenue to Graver's lane	6	960
Uber street,	from Westmoreland to Ontario	6	525
Upsal street,	from southwest house line of Germantown avenue, northeast	12	41
Upsal street,	from 27 feet 6 inches southwest of northeast house line of Jefferson to southwest house line of Germantown avenue	10	1,473
Walnut lane,	from 28 feet 9 inches southwest of centre of Wayne, northeast	6	29
Washington lane,	from centre of Green to southwest house line of Adams	6	758
Westmoreland street,	from Nineteenth to Twentieth	6	448
Willow avenue,	from 37 feet 6 inches southeast of centre of Chelten avenue, northwest	6	74
Wilson street,	from 25 feet 3 inches southeast of centre of Chelten avenue, northwest	6	54
Wissahickon avenue,	from Chelten avenue to Lehman	6	505
Woodbine avenue,	from centre of Chew street to 12 feet northeast of northeast house line of Boyer	6	733
	Total		29,745

Street.	Location.	Size in inches.	Distance in feet.
Fire hydrant connections		6	1,357
	Supply Connections (Private.)		
Pulaski avenue, from Chelton avenue northwest, to supply Germantown Poor House		4	305
	Fire Connections (Private.)		
Armat street, southeast side, 266 feet 6 inches southwest of southwest house line of Cumberland street, for Wilson H. Brown		4	18
Cumberland street, northeast side, 91 feet 6 inches southeast of southeast house line of Mill street, for B. Hammill & Co		4	22
Jefferson street, northwest side, 171 feet southwest of southwest property line of Philadelphia & Reading Railroad, for Samuel Wood		4	15
Sharpnack street, northwest side, 830 feet northeast of Germantown avenue, for Randall & Bros		4	17
Total			72
	Motor Connections (Private).		
Germantown avenue, northeast side, 76 feet 5 inches northwest of northwest house line of Mill, for Market Square Presbyterian Church		4	113
	Pipe taken up.		
Marion street, from 17 feet southeast of northwest house line of Lehman, to 24 feet northwest of southeast house line of Rittenhouse		3	303
Walnut lane, from 26 feet southwest of northeast house line of Hancock, northeast		4	38
Wyoming avenue, from Germantown avenue to Stenton avenue		3	321
Total			662
Fire-hydrant connections taken up		3	23
" " "		4	378
" " "		6	13
Total			414

Street.	Location.	Size in inches.	Distance in feet.
	Pipe relaid.		
Harvey street, from centre of Wayne, northeast		6	44
Marion street from 17 feet southeast of northwest house line of Lehman, to 24 feet northwest of southeast house line of Rittenhouse		6	303
Walnut lane, from 26 feet 8 inches southwest of northeast house line of Hancock, northeast		6	41
Wayne street, from 12 feet southwest of southeast house line of Walnut lane, to centre of Lafayette		6	762
Wyoming street, from Germantown avenue to Stenton avenue		6	353
	Total		1,503
Fire-hydrant connections, relaid		6	510
Repairs, general		3	16
" "		4	26
" "		6	307
" "		8	13
" "		10	10
	Total		372
	Pipe lowered.		
Baker street, from 30 feet northeast of northeast house line of Germantown avenue northeast		6	60
Broad street, west side, from 745 feet south of south house house line of Fisher's lane north		4	245
Green street, from 250 feet southeast of centre of Upsal northwest		6	250
High street, from 340 feet northeast of northeast house line of Morton northeast		6	238
Sprague street, from 234 feet southwest of southwest house line of Ardleigh northeast		6	134
Twentieth street, from 175 feet southeast of centre of Ruscomb northwest		6	175
Wayne street, from 81 feet southeast of centre of Lafayette northwest		6	81
	Total		1,183

Street.	Location.	Size in inches.	Distance in feet.
Pipe cut off and abandoned.			
Harvey street,	from centre of Wayne northeast	3	44
Wayne street,	from 12 feet southeast of southeast house line of Walnut lane to centre of Lafayette	3	761
Total			803
Fire hydrant connections cut off and abandoned		4	62
		6	20
Total,			82

Recapitulation of Sixth District.

	Purposes for which used.	Size—Inches. 3	4	6	8	10	12	Totals in feet and pounds.
New pipe or feet added.	Service mains	.....	.....	27,821	.....	1,473	451	29,745
	Fire-hydrant connections	.....	.....	1,357	.....	.....	.....	1,357
	Fire connections (private)	.....	72	.....	.....	.....	.....	72
	Supply connections (private)	.....	305	.....	.....	.....	.....	305
	Motor connections (private)	.....	113	.....	.....	.....	.....	113
	Total... feet	.....	490	29,178	.....	1,473	451	31,592
	Total... pounds	.....	9,310	962,874	.....	81,015	32,472	1,085,671
Pipe used, but adding nothing to feet in the ground.	Pipe relaid	.....	.....	2,013	.....	.....	.....	2,013
	Repairs general	16	26	307	13	10	.....	372
	Pipe taken up	647	414	13	.....	.....	.....	1,074
	Pipe lowered	.....	245	938	.....	.....	.....	1,183
	Total... feet	663	685	3,271	13	10	.....	4,642
	Total... pounds	9,945	13,015	107,943	546	550	.....	131,999
	Total handled... feet	663	1,175	32,449	13	1,483	451	36,234
	Total handled... pounds	9,945	22,325	1,070,817	546	81,565	32,472	1,217,670
	Pipe cut off and abandoned	805	62	20	.....	.....	.....	887

Recapitulation of Work on the Water Pipes.

	Purposes for which used.	Size—Inches.												Totals in feet and pounds.
		1½	3	4	6	8	10	12	16	20	30	36	48	
New pipe or feet added.	Service mains				106,215	3,447	1,759	1,298						112,719
	Supply mains							156	6,339		41	199	148	6,883
	Pumping mains												1,955	1,955
	Service main connections				65									65
	Supply main connections				96	29	492		52	137	104			910
	Pumping main connections										99			99
	Bye-pass connections				541	37		39						617
	Fire-hydrant connections				8,750									8,750
	Fire connections (private)			447	44									491
	Supply connections (private)			374	124									498
	Motor connections (private)			113										113
	Drains		19	99	243	80								441
	New check valve										11			11
	Total... feet		19	1,033	116,078	3,593	2,251	1,493	6,391	137	255	199	2,103	133,552
	Total... pounds		285	19,627	3,830,574	150,906	123,805	107.496	703,010	21,783	84,660	83,978	1,230,255	6,356,379
Pipe used, but adding nothing to feet in the ground.	Pipe relaid			44	18,752		28	119	10		49	24		19,026
	Repairs general		54	207	4,215	151	247	210	33	80	129	18	45	5,389
	Pipe taken up	149	7,988	7,047	561					9	49	62		15,865
	Pipe lowered			245	3,929						190			4,364
	Pipe raised				1,191									1,191
	Pipe shifted				108									108
	Total... feet	149	8,042	7,543	28,756	151	275	329	43	89	417	104	45	45,943
	Total... pounds	1,043	120,630	143,317	948,948	6,342	15,125	23,688	4,730	14,151	138,444	43,888	26,825	1,486,631
	Total handled feet	149	8,061	8,576	144,834	3,744	2,526	1,822	6,434	226	672	303	2,148	179,495
	Total handled pounds	1,043	120,915	162,944	4,779,522	157,248	138,930	131,184	707,740	35,934	223,104	127,866	1,256,580	7,843,010
	Pipe cut off and abandoned	35	1,241	3,883	159									5,318

RECAPITULATION BY DISTRICTS.

	Districts.	Size—Inches.												Totals.	
		1½	3	4	6	8	10	12	16	20	30	36	48	Feet.	Pounds.
New pipe or feet added.	First	.....	.....	60	15,617	.....	85	.....	5,089	.....	6	.....	.....	20,857	1,082,958
	Second	.....	19	123	16,328	1,787	271	196	.....	.....	.....	.....	.....	18,724	645,517
	Third	.....	.....	198	16,095	1,236	277	554	52	11	46	.....	.....	18,469	664,673
	Fourth	.....	.....	66	30,871	570	120	136	1,094	64	190	199	2,103	35,413	2,568,158
	Fifth	.....	.....	96	7,989	.....	25	156	156	62	13	.....	.....	8,497	309,402
	Sixth	.....	.....	490	29,178	.....	1,473	451	.....	.....	.....	.....	.....	31,592	1,085,671
	Total feet	.....	19	1,033	116,078	3,593	2,251	1,493	6,391	137	225	199	2,103	133,552	.....
	Total pounds	.....	285	19,627	3,839,574	150,906	123,805	107,496	703,010	21,783	84,660	83,978	1,230,255	.....	6,356,379
Pipe used, but adding nothing to feet in the ground.	First	.....	2,761	4,467	8,654	17	17	3	17	16	.....	.....	.....	15,952	418,149
	Second	149	4,610	1,164	6,713	74	86	182	.....	10	.....	.....	.....	12,988	336,370
	Third	.....	.....	460	5,035	40	50	13	9	.....	220	.....	.....	5,827	254,291
	Fourth	.....	8	681	3,366	7	112	126	17	57	189	104	45	4,712	283,557
	Fifth	.....	.....	86	1,717	.....	.....	5	.....	6	8	.....	.....	1,822	62,265
	Sixth	.....	663	685	3,271	13	10	.....	.....	.....	.....	.....	.....	4,642	131,999
	Total feet	149	8,042	7,543	28,756	151	275	329	43	89	417	104	45	45,943	.....
	Total pounds	1,043	120,630	143,317	948,948	6,342	15,125	23,688	4,730	14,151	138,444	43,888	36,325	.....	1,486,631
Total handled	feet	149	8,061	8,576	144,834	3,744	2,526	1,822	6,434	226	672	303	2,148	179,495	.....
	pounds	1,043	120,915	162,944	4,779,522	157,248	138,930	131,184	707,740	35,934	223,104	127,866	1,256,580	.....	7,843,010
Pipe cut off and abandoned		35	1,241	3,883	159	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,318

NEW FIRE HYDRANTS.

First District.

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Bainbridge street, southeast corner of Second	4	6	20 ft.				1
Barnwell street, northeast corner of Bainbridge	30	6	12 ft. 8 in.				1
Broad street, northeast corner of Castle avenue	26	6	16 ft. 8 in.				1
Broad street, northeast corner of Morris	26	6	14 ft. 10 in.				1
Broad street, southeast corner of Tasker	26	6	17 ft. 3 in.				1
Broad street, northeast corner of Dickinson	26	6	9 ft. 8 in.				1
Broad street, northwest corner of Reed	26	6	6 ft. 6 in.				1
Broad street, southeast corner of Wharton	26	6	5 ft.				1
Broad street, southwest corner of Fitzwater	30	6	9 ft. 6 in.				1
Broad street, southeast corner of Fitzwater	3	6	11 ft.				1
Clark street, north side, 56 feet east of east house line of Fourth	2	6	9 ft. 9 in.		1		
Cuba street, west side, 85 feet south of south house line of Moore	1	4	8 ft. 6 in.		1		
Dickinson street, southwest corner of Tenth	26	16	22 ft.				1
Dickinson street, northeast corner of Twelfth	26	16	8 ft.				1
Dickinson street, northwest corner of Twenty-first	26	6	16 ft. 6 in.				1

New Fire Hydrants—First District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Dorrance street, southeast corner of Wharton	26	6	13 ft.				1
Dorrance street, southwest corner of Carpenter	30	6	16 ft. 8 in.				1
Dudley street, south side, 182 feet west of west house line of Fourth	1	6	8 ft. 6 in.		1		
Eighth street, northwest corner of Federal	2	6	18 ft.				1
Eighth street, northeast corner of Dickinson	1	16	11 ft.				1
Eighteenth street, southeast corner of Tasker	26	6	22 ft.				1
Eighteenth street, southeast corner of Fitzwater	30	6	17 ft. 9 in.				1
Ellsworth street, south side, 109 feet east of east house line of Twenty-fourth	26	6	15 ft.			1	
Emily street, north side, 195 feet east of east house line of Fifth	1	6	8 ft.		1		
Field street, north side, 143 feet west of west house line of Twelfth	1	6	8 ft. 6 in.		1		
Front street, southwest corner of Washington avenue	2	8	18 ft. 3 in.				1
Front street, northeast corner of Washington avenue	2	8	21 ft.				1
Front street, northeast corner of Bainbridge	4	8	18 ft. 3 in.				1
Fourth street, southeast corner of Redwood	2	6	17 ft. 10 in.				1
Fourth street, northwest corner of Dickinson	1	16	16 ft. 6 in.				1
Fourth street, west side, south house line of Washington avenue	2	6	15 ft. 4 in.			1	

New Fire Hydrants—First District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Fifth street, southeast corner of Watkins	1	6	17 ft.	.....	.....	.....	1
Fifth street, northeast corner of Dickinson	1	16	15 ft.	.....	.....	.....	1
Fifth street, northwest corner of Wharton	1	6	17 ft. 6 in.	.....	.....	.....	1
Fifth street, southwest corner of Washington avenue	2	6	15 ft.	.....	.....	.....	1
Fifth street, northeast corner of Washington avenue	2	6	10 ft.	.....	.....	.....	1
Fifth street, northeast corner of Carpenter	2	6	16 ft.	.....	.....	1	
Fifth street, northwest corner of Marriott	2	6	8 ft.	.....	.....	.....	1
Fifth street, northeast corner of Queen	3	6	19 ft.	.....	.....	.....	1
Fifteenth street, southeast corner of Fitzwater	30	6	17 ft. 8 in.	.....	.....	.....	1
Hicks street, west side, 197 feet 6 inches north of north house line of Moore	26	6	8 ft.	.....	.....	1	
Jessup street, east side, 52 feet south of south house line of Fitzwater	3	6	5 ft.	.....	1		
Lilly Ann street, west side, 163 feet south of south house line of Bainbridge	4	6	5 ft.	.....	1		
McClellan street, north side, 226 feet west of west house line of Twentieth	26	6	10 ft. 6 in.	.....	1		
McIlwain street, south side, east house line of Fourth	2	6	9 ft.	.....	.....	1	
McKean street, south side, west house line of Eighth	1	6	10 ft. 6 in.	.....	.....	1	
McKean street, southeast corner of Ninth	1	6	18 ft. 6 in.	.....	.....	.....	1

New Fire Hydrants—First District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Mercy street, south side, 179 feet east of east house line of Fifth		1	6	18 ft.	.....	1		
Mole street, west side, 196 feet north of north house line of Moore		26	6	8 ft.	.....	.....	1	
Moyamensing avenue, northwest corner of Morris		1	6	19 ft.	.....	.....	.....	1
Moyamensing avenue, northeast corner of Dickinson		1	6	7 ft.	.....	.....	.....	1
Passyunk avenue, southeast side, east house line of Twenty-fifth		26	10	6 ft. 6 in.	.....	.....	1	
Penn street, west side, 45 feet north of north house line of Bainbridge		4	6	15 ft. 4 in.	.....	.....	1	
Pierce street, north side, 68 feet 8 inches east of east house line of Eighth		1	4	8 ft. 10 in.	.....	.....	1	
Pritchett street, north side, 342 feet west of west house line of Thirteenth		26	3	6 ft. 6 in.	.....	1	.....	.....
Queen street, north side, 65 feet east of east house line of Burd		3	6	14 ft. 10 in.	.....	1	.....	.....
Redwood street, southwest corner of Third		2	6	14 ft.	.....	.....	.....	1
Redwood street, southwest corner of Fifth		2	6	13 ft. 6 in.	.....	.....	.....	1
Redwood street, north side, 44 feet east of east house line of Fifth		2	6	11 ft. 6 in.	.....	1	.....	.....
Reed street, south side, 138 feet east of east house line of Fifth		1	6	18 ft. 8 in.	.....	.....	1	.....
Second street, northeast corner of Reed		1	6	8 ft. 8 in.	.....	.....	.....	1
Sixth street, southeast corner of Moore		26	6	16 ft. 8 in.	.....	.....	.....	1
Sixth street, northeast corner of Sylvester		1	6	16 ft. 9 in.	.....	.....	1	.....

New Fire Hydrants—First District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Sixth street, southwest corner of Mifflin		1	6	5 ft. 9 in.	.....	.....	.....	1
Sixth street, northwest corner of Dickinson		1	16	11 ft.	.....	.....	.....	1
Sixth street, southwest corner of Washington avenue		2	6	13 ft.	.....	.....	.....	1
Seventh street, northeast corner of Alaska		4	6	14 ft.	.....	.....	.....	1
Sixteenth street, southeast corner of Fitzwater		30	6	17 ft. 6 in.	.....	.....	.....	1
Seventeenth street, northeast corner Kater		30	6	12 ft.	.....	.....	.....	1
Seventeenth street, southwest corner of South		30	6	19 ft.	.....	.....	.....	1
Siegel street, south side, 202 feet west of west house line of Twentieth		26	6	10 ft. 6 in.	.....	1	.....	.....
South street, south side, 13 feet 6 inches east of east house line of Broad		4	16	16 ft.	.....	.....	1	.....
Suffolk street, south side, 103 feet east of east house line of Ninth		2	3	7 ft. 6 in.	.....	1	.....	.....
Tasker street, northeast corner of Bancroft		26	6	12 ft. 10 in.	.....	.....	.....	1
Third street, northwest corner of Bainbridge		4	6	14 ft. 8 in.	.....	.....	.....	1
Tenth street, southeast corner of Morris		26	6	18 ft.	.....	.....	.....	1
Tenth street, northwest corner of Fernon		1	6	17 ft. 6 in.	.....	.....	.....	1
Tenth street, southwest corner of Carpenter		2	6	17 ft.	.....	.....	.....	1
Twelfth street, southeast corner of Tasker		26	6	15 ft.	.....	.....	.....	1

New Fire Hydrants—First District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Twelfth street, east side, 73 feet north of north house line of Reed		26	6	15 ft.	.....	.....	1	.....
Twelfth street, northwest corner of Brinton		4	6	18 ft.	.....	.....	.....	1
Twelfth street, east side, south house line of Catharine		3	6	15 ft.	.....	.....	1	.....
Thirteenth street, southwest corner of Ellsworth		26	6	15 ft. 3 in.	.....	.....	.....	1
Thirteenth street, northwest corner of Catharine		3	6	15 ft. 4 in.	.....	.....	.....	1
Thirteenth street, southeast corner of Wharton		26	6	17 ft. 2 in.	.....	.....	.....	1
Twentieth street, northeast corner of Pierce		26	6	12 ft.	.....	.....	1	.....
Twentieth street, northeast corner of Fitzwater		30	6	18 ft.	.....	.....	.....	1
Twenty-first street, southwest corner of Reed		26	6	14 ft. 4 in.	.....	.....	.....	1
Twenty-second street, northeast corner of Reed		26	12	19 ft. 6 in.	.....	.....	.....	1
Twenty-second street, southeast corner of Wharton		26	6	16 ft.	.....	.....	.....	1
Twenty-second street, southwest corner of Carpenter		30	6	19 ft.	.....	.....	.....	1
Twenty-third street, west side, south house line of Washington		26	6	15 ft.	.....	.....	1	.....
Twenty-third street, northeast corner of Washington avenue		30	6	11 ft. 8 in.	.....	.....	.....	1
Twenty-fourth street, northwest corner of South		30	6	18 ft. 6 in.	.....	.....	.....	1
Twenty-fifth street, northeast corner of Ellsworth		26	6	15 ft.	.....	.....	.....	1

New Fire Hydrants—First District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Thirty-first street, northeast corner of Oakford	26	6	16 ft.	.....	.....	.....	1
Titan street, north side, 189 feet west of west house line of Twenty-second	26	6	8ft. 6 in.	.....	1	.....	.....
Ward street, east side, 103 feet north of north house line of Federal	26	6	8 ft.	.....	1	.....	.....
Ward street, southwest corner of Carpenter	30	6	18 ft.	.....	.....	.....	1
Washington avenue, north side, east house line of Fourth	2	6	8 ft.	.....	.....	1	.....
Washington avenue, north side, west house line of Sixth	2	6	8 ft. 6 in.	.....	.....	1	.....
Washington avenue, southwest corner of Twentieth	26	6	11 ft. 6 in.	.....	.....	.....	1
Wharton street, southwest corner of Ward	26	6	13 ft.	.....	.....	.....	1
Woodbine street, southeast corner of Federal	2	6	13 ft.	.....	.....	1	.....
Total	.....	.....	1,419 ft. 4 in.	.....	16	21	67

New Fire Hydrants—Continued.

Second District.

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Baltimore avenue, northwest corner of Forty-second		27	6	24 ft.	.....	.....	.....	1
Barker street, north side, opposite centre of Albion		9	4	23 ft.	1	.....	.....	.....
Broad street, southeast corner of Rodman		7	6	7 ft.	.....	.....	.....	1
Broad street, west side, south house line of Lombard		7	6	5 ft. 6 in.	.....	.....	1	.....
Broad street, west side, 3 feet south of south house line of Pine		7	20	9 ft. 6 in.	.....	.....	1	.....
Broad street, southeast corner of Spruce		7	6	4 ft. 9 in.	.....	.....	.....	1
Broad street, southeast corner of Locust		8	6	5 ft.	.....	.....	.....	1
Brown street, south side, 3 feet east of east house line of Thirty-eighth		24	6	14 ft. 4 ft.	.....	.....	1	.....
Buckley street, north side, 159 feet 6 inches east of east house line of Sixth		5	6	7 ft. 5 in.	.....	1	.....	.....
Budd street, southwest corner of Baring		24	6	11 ft. 9 in.	.....	.....	1	.....
Cherry street, southeast corner of Twentieth		10	6	12 ft.	.....	.....	.....	1
Cherry street, southeast corner of Twenty-first		10	6	21 ft. 6 in.	.....	.....	.....	1
Cherry street, south side, opposite centre of Freelander		10	6	11 ft.	.....	.....	.....	1
Cyprus street, south side, 68 feet east of east house line of Fourth		5	6	7 ft. 9 in.	.....	1	.....	.....
Eleventh street, east side, 3 feet south of south house line of Market		9	10	14 ft.	.....	.....	1	.....

NEW FIRE HYDRANTS—SECOND DISTRICT—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Forty-second street, southeast corner of Powelton avenue	24	8	20 ft.	.....	.....	.....	1
Forty-second street, east side, 2 feet south of south house line of Baring	24	8	18 ft. 6 in.	.....	.....	1	
Forty-second street, southeast corner of Spring Garden	24	8	20 ft. 7 in.	.....	.....	.....	1
Forty-fourth street, west side, 180 feet south of south house line of Locust	27	6	18 ft.	.....	1		
Forty-fifth-and-a-half street, west side, south house line of Saybrook	27	6	10 ft. 5 in.	.....	.....	1	
Forty-sixth street, east side, 402 feet 6 inches south of south house line of Saybrook	27	6	21 ft. 1 in.	.....	1		
Forty-sixth street, northwest corner of Chester avenue	27	8	26 ft. 6 in.	.....	.....	.....	1
Fifty-fourth street, west side, 4 feet south of south house line of Lansdowne avenue	24	6	13 ft. 4 in.				
Gray's Ferry road, north side, west house line of Forty-eighth	27	6	24 ft. 10 in.	.....	.....	.....	1
Girard street, south side, 198 feet east of east house line of Twelfth	9	6	9 ft. 6 in.	.....	1		
Girard avenue, southeast corner of Thirty-seventh	24	12	23 ft. 8 in.	.....	.....	.....	1
Girard avenue, south side, east house line of Thirty-eighth	24	12	22 ft. 10 in.	.....	.....	1	
Greenway avenue, south side, 278 feet 3 inches east of east house line of Forty-ninth	27	6	23 ft. 8 in.	.....	1		
Griscom street, east side, 217 feet north of north house line of Pine	5	6	8 ft.	.....	.....	1	
Hamilton street, southeast corner of Thirty-third	24	6	18 ft.	.....	.....	.....	1
Hanson street, east side, 226 feet south of south house line of Greenway avenue	27	6	8 ft. 6 in.	.....	1		

NEW FIRE HYDRANTS—SECOND DISTRICT—*Continued.*

Street. Location.	Ward.	Size of Main in Inches.	CONNECTION.	STYLE.			
			6 inch.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Haverford avenue, north side, east house line of Wyoming	24	6	23 ft.	.....	.....	1	
Hunter street, north side, west house line of Tenth	9	6	11 ft.	.....	1		
Jacoby street, northwest corner of Cherry	10	6	11 ft. 3 in.	.....	.....	.....	1
Jacoby street, southwest corner of Race	10	6	10 ft. 9 in.	.....	.....	.....	1
Lansdowne avenue, north side, 208 feet 6 inches west of west house line of Conestoga	24	6	13 ft. 4 in.				
Mantua avenue, west side, 12 feet north of north house line of Mt. Vernon	24	6	20 ft. 8 in.	.....	.....	1	
Market street north side, 4 feet east of east house line of Eighth	9	6	7 ft. 8 in.	.....	.....	1	
Market street, northeast corner of Tenth	9	6	22 ft.	.....	.....	.....	1
Market street, south side, east house line of Twelfth	9	6	9 ft.	.....	.....	1	
Market street, south side, 4 feet west of west house line of Fifteenth	9	6	7 ft. 9 in.	.....	.....	1	
Melloy street, south side, 164 feet east of east house line of Sixteenth	9	6	5 ft. 1 in.	.....	1		
Market street, south side, 2 feet west of west house line of Twenty-second	9	6	8 ft. 2 in.	.....	.....	1	
Market street, southeast corner of Twenty-third	9	6	9 ft.	.....	.....	.....	1
Merion avenue, north side, opposite centre of Fiftieth	24	6	13 ft. 10 in.	.....	.....	1	
Pine street, southwest corner of Thirty-fourth	27	6	22 ft. 4 in.	.....	.....	.....	1
Preston street, northwest corner of Reno	24	6	14 ft.	.....	.....	1	

New Fire Hydrants—Second District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 inch.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Sansom street, north side, 204 feet west of west house line of Twelfth	8	6	12 ft.	.....	1		
Sansom street, west side, 3 feet west of west house line of Forty-second	27	6	11 ft. 7 in.	.....	1		
Seventeenth street, northwest corner of Spring	10	6	16 ft.	.....	.....	1	
Sixteenth street, east side, 1 foot 6 inches north of north house line of Chestnut	9	6	13 ft. 8 in.	.....	.....	1	
Sixty-third-and-a-half street, west side, south house line of Callowhill	24	6	14 ft. 6 in.	.....	.....	.....	1
Spruce street, north side, 1 foot west of west house line of Forty-fifth	27	8	22 ft. 10 in.	.....	.....	1	
Summer street, southeast corner of Twenty-second	10	3	17 ft.	.....	.....	.....	1
Summer street, southwest corner of Twenty-second	10	6	10 ft.	.....	.....	1	
Twelfth street, west side, opposite centre of Girard street	9	6	13 ft. 6 in.	.....	.....	1	
Thirteenth street, northwest corner of Lombard	7	6	15 ft.	.....	.....	.....	1
Thirteenth street, southwest corner of Locust	8	6	23 ft.	.....	.....	.....	1
Twenty-second street, northwest corner of Arch	10	12	25 ft. 2 in.	.....	.....	.....	1
Twenty-third street, west side, opposite centre of Summer	10	6	13 ft. 7 in.	.....	.....	1	
Twenty-third street, opposite centre of Johnson	9	10	18 ft. 8 in.	.....	.....	1	
Twenty-fourth street, southwest corner of Naudain	7	6	20 ft. 6 in.	.....	.....	.....	1
Thirty-second street, southwest corner of Race	24	6	19 ft. 3 in.	.....	.....	.....	1

New Fire Hydrants—Second District—*Continued.*

Street. Location.	Ward.	Size of Main in Inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Thirty-fourth street, northeast corner of Filbert	24	6	22 ft.	.....	.....	.....	1
Thirty-sixth street, northeast corner of Sansom	27	6	23 ft. 2 in.	.....	.....	.....	1
Trinity place, north side, 333 feet east of east house line of Forty-ninth	27	6	14 ft. 3 in.	.....	1		
Thirty-fourth street, southeast corner of Haverford avenue	24	4	28 ft. 6 in.	.....	.....	.....	1
Union street, north side, 124 feet east of east house line of Fourth	5	4	13 ft. 1 in.	.....	1		
Upland street, south side, 199 feet west of west house line of Ann	27	6	13 ft. 11 in.	.....	1		
Wallace street, northwest corner of Thirty-seventh	24	6	15 ft. 6 in.	.....	.....	.....	1
Walnut street, northeast corner of Forty-second	27	8	20 ft.	.....	.....	.....	1
Westminster avenue, north side, 127 feet west of west house line of Fifty-third	24	12	16 ft. 2 in.	.....	.....	.....	1
Total	.....	.....	1,107 ft. 7 in.	1	14	24	31

New Fire Hydrants—Continued.

Third District.

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Adams street,	south corner of Amber	31	6	15 ft. 9 in.	.....	.....	.....	1
Adams street,	southwest side southeast house line of Emerald	31	6	14 ft. 5 in.	.....	.....	1	
Adams street,	northeast side west house line of Sellers	23	6	10 ft. 7 in.	.....	.....	1	
Allegheny avenue,	south corner of Emerald	25	6	11 ft. 7 in.	.....	.....	.....	1
Amber street,	northwest corner of Susquehanna avenue	31	6	15 ft. 6 in.	.....	.....	.....	1
Amber street,	northeast side north house line of Ontario	25	6	15 ft. 3 in.	.....	.....	1	
Aramingo street,	northeast corner of Memphis	31	6	14 ft. 4 in.	.....	.....	.....	1
Aramingo street,	northeast side, 83 feet northwest of northwest house line of Memphis	31	6	12 ft. 7 in.	.....	1		
Arrott street,	southwest corner of Franklin	23	6	16 ft. 8 in.	.....	.....	.....	1
Beaver street,	northeast corner of Charlotte	16	6	10 ft. 2 in.	.....	.....	.....	1
Berks street,	northeast corner of Mascher	19	6	28 ft.	.....	.....	.....	1
Bridge street,	north side east house line of Frankford road	23	6	15 ft.	.....	.....	1	
Buttonwood street,	south side, 2 feet east of east house line of Sixth	11	6	17 ft. 4 in.	.....	.....	1	
Cadwallader street,	west side, 243 feet north of north house line of Columbia avenue	19	4	11 ft. 3 in.	.....	.....	1	
Cambria street,	west corner of Amber	25	6	19 ft.	.....	.....	.....	1

NEW FIRE HYDRANTS—THIRD DISTRICT—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Cambria street, south side east house line of "C"	25	6	14 ft.	.....	.....	1	
Cambria street, southeast corner of Rosehill	25	6	14 ft. 8 in.	.....	.....	.....	1
Cambria street, northwest corner of Leamy	25	6	16 ft.	.....	.....	.....	1
Church street, southeast corner of Adams	23	6	14 ft. 7 in.	.....	.....	.....	1
Church street, south side, 152 feet 6 inches west of west house line of Tacony road	23	6	18 ft. 10 in.	.....	1		
Church street, southwest corner of Tacony road	23	6	22 ft. 6 in.	.....	.....	.....	1
Cumberland street, east house line of Fourth	19	6	14 ft. 8 in.	.....	.....	1	
Cumberland street, southeast corner of Fifth	19	6	14 ft. 6 in.	.....	.....	.....	1
Cumberland street, south side east house line of Fairhill	19	6	16 ft.	.....	.....	1	
Denver street, southeast corner of Boudinot	25	6	10 ft.	.....	.....	.....	1
Diamond street, southeast corner of Second	19	6	15 ft. 5 in.	.....	.....	.....	1
Diamond street, southeast corner of America	19	6	16 ft. 10 in.	.....	.....	.....	1
Diamond street, southwest corner of Bodine	19	6	17 ft.	.....	.....	.....	1
Diamond street, southwest corner of Third	19	6	15 ft. 5 in.	.....	.....	.....	1
Division street, south side east house line of Salmon	25	6	8 ft. 2 in.	.....	.....	1	
Edward street, southwest corner of Sophia	16	6	12 ft. 9 in.	.....	.....	.....	1

New Fire Hydrants—Third District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Edward street, southeast corner of Ruan		23	6	15 ft. 7 in.	.....	.....	.....	1
Eighth street, northeast corner of Cumberland		19	6	15 ft. 6 in.	.....	.....	.....	1
Emlen street, southeast corner of Gaul		31	6	13 ft. 6 in	.....	.....	.....	1
Evans street, east side, 125 feet south of south house line of Reeves		25	6	8 ft.	.....	1	.....	.....
Fairhill street, west side, 168 feet north of north house line of Pike		25	6	14 ft. 1 in.	.....	1	.....	.....
Front street, southeast corner of Columbia avenue		19	6	20 ft.	.....	.....	.....	1
Front street, northwest corner of Harrison		19	6	22 ft.	.....	.....	.....	1
Fourth street, east side, 64 feet south of south house line of York		19	6	14 ft. 11 in.	.....	1	.....	.....
Fifth street, west side, south house line of Wood		12	6	14 ft. 8 in.	.....	.....	1	.....
Fifth street, east side, 1 foot 6 inches south of north house line of Callowhill		12	6	15 ft. 7 in.	.....	.....	1	.....
Fifth street, southeast corner of Buttonwood		12	6	17 ft. 9 in.	.....	.....	.....	1
Fifth street, west side, 9 feet 3 inches south of south house line of Berks		19	6	12 ft. 2 in.	.....	.....	1	.....
Fillmore street, southwest corner of Somerset		25	6	16 ft. 3 in.	.....	.....	.....	1
Fillmore street, northeast side, 328 feet southeast of southeast house line of Frankford avenue		23	6	11 ft. 10 in.	1	.....	.....	.....
Fisher street, south corner of Westmoreland		25	6	9 ft.	.....	.....	.....	1
Frankford avenue, east side, 26 feet south of south house line of Savery		18	10	19 ft. 8 in.	.....	.....	1	.....

New Fire Hydrants—Third District—*Continued.*

Street.	Location.	Ward.	Size of Main in Inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Geisler street, southeast corner of Miller		25	6	8 ft. 10 in.	.....	.....	.....	1
Henderson street, north side, east house line of American		19	6	7 ft. 11 in.	1	.....	.....	.....
Hope street, west side, 169 feet north of north house line of Master		17	6	9 ft. 4 in.	.....	1	.....	.....
Hope street, east side, 185 feet south of south house line of Berks		19	6	7 ft. 7 in.	.....	1	.....	.....
Hope street, northeast corner of Berks		19	6	7 ft. 7 in.	.....	.....	.....	1
Howard street, west side, 159 feet south of south house line of Lehigh avenue		19	6	14 ft.	.....	1	.....	.....
Huntingdon street, northwest corner of Richmond		18	6	23 ft. 11 in.	.....	.....	.....	1
Huntingdon street, northwest corner of Hancock		19	6	17 ft.	.....	.....	.....	1
Huntingdon street, southwest corner of Philip		19	6	15 ft. 8 in.	.....	.....	.....	1
Huntingdon street, northwest corner of Third		19	6	15 ft. 3 in.	.....	.....	.....	1
Huntingdon street, northwest corner of Fifth		19	6	15 ft. 7 in.	.....	.....	.....	1
Indiana avenue, southeast corner of "D"		25	6	15 ft. 10 in.	.....	.....	.....	1
Jasper street, northwest side, 258 feet southwest of southwest house line of Somerset		25	6	14 ft. 9 in.	1	.....	.....	.....
Jefferson street, south corner of Prune		23	6	15 ft. 9 in.	.....	.....	.....	1
Jefferson street, southeast side, 118 feet southwest of southwest house line of Gillingham		23	6	16 ft. 4 in.	.....	.....	.....	1
Julianna street, northeast corner of Callowhill		12	6	16 ft. 6 in.	.....	.....	.....	1

NEW FIRE HYDRANTS—THIRD DISTRICT—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Kensington avenue, east corner of Huntingdon	31	6	10 ft. 3 in.	.....	.....	.....	1
Kensington avenue, south corner of Venango	25	6	12 ft.	.....	.....	.....	1
Kensington avenue, southwest corner of Harrowgate lane	25	6	13 ft.	.....	.....	.....	1
Laurel street, south side, east house line of Front	16	10	15 ft. 6 in.	.....	.....	1	.....
Laurel street, southwest corner of Canal	16	10	15 ft. 7 in.	.....	.....	.....	1
Lawrence street, west side, 272 feet south of south house line of Girard avenue	16	6	11 ft. 4 in.	.....	1	.....	.....
Lehigh avenue, northeast corner of Hutchinson	25	6	11 ft. 6 in.	.....	.....	.....	1
Leib street, east side, 104 feet north of north house line of Columbia avenue	19	4	11 ft. 10 in.	.....	1	.....	.....
Lesher street, southeast corner of Meadow	23	6	15 ft.	.....	.....	.....	1
Linden street, north side, 136 feet east of east house line of Melvale	25	6	13 ft. 10 in.	1	.....	.....	.....
Margaretta street, southwest corner of Cedar	23	12	14 ft. 9 in.	.....	.....	.....	1
Margaretta street, southeast corner of Frankford avenue	23	12	15 ft.	.....	.....	.....	1
Marshall street, northwest corner of Tioga	25	6	20 ft. 6 in.	.....	.....	.....	1
Mascher street, west side, south house line of Master	17	6	13 ft. 4 in.	.....	.....	1	.....
Mascher street, southeast corner of Jefferson	17	6	15 ft.	.....	.....	.....	1
Mascher street, west side, south house line of Oxford	17	6	15 ft. 3 in.	.....	.....	1	

New Fire Hydrants—Third District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Mascher street, west side, 265 feet 6 inches south of south house line of Berks		19	6	11 ft. 10 in.	.....	1	.....	.....
Meadow street, northeast corner of Cherry		23	6	15 ft. 7 in.	.....	.....	.....	1
Meadow street, northeast side, 22 feet southeast of southeast house line of Paul		23	6	16 ft. 3 in.	.....	.....	1	.....
Meighan street, northeast side, 210 feet southeast of southeast house line of Kensington avenue		25	6	11 ft. 8 in.	.....	1	.....	.....
Memphis street, northeast corner of Cumberland		31	6	15 ft. 3 in.	.....	.....	1	.....
Montgomery avenue, west house line of Front		19	6	15 ft.	.....	.....	1	.....
Montgomery avenue, southeast corner of Howard		19	6	15 ft.	.....	.....	.....	1
Montgomery avenue, northwest corner of Fourth		19	6	15 ft. 7 in.	.....	.....	.....	1
Moyer street, northeast corner of Ash		18	6	16 ft. 4 in.	.....	.....	.....	1
Mulberry street, northeast corner of Orthodox		23	6	16 ft. 7 in.	.....	.....	.....	1
Ninth street, northwest corner of Somerset		25	6	17 ft.	.....	.....	.....	1
Noble street, northeast corner of Fourth		12	6	21 ft.	.....	.....	.....	1
Noble street, south side, west house line of Fourth		12	6	12 ft. 8 in.	.....	.....	1	.....
Noble street, southwest corner of Fifth		12	6	15 ft. 4 in.	.....	.....	.....	1
Noble street, north side, 1 foot 6 inches east of east house line of Sixth		12	6	11 ft. 6 in.	.....	.....	1	.....
Ontario street, northeast corner of Janney		25	8	22 ft.	.....	.....	.....	1

New Fire Hydrants—Third District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Ontario street, southwest corner of Tulip	25	8	19 ft. 6 in.				1
Ontario street, southeast corner of Trenton avenue	25	8	21 ft.				1
Orleans street, north corner of Emerald	25	6	15 ft. 4 in.				1
Orthodox street, northeast corner of Pierce	23	6	17 ft. 6 in.				1
Orthodox street, southeast corner of Bermuda	23	6	17 ft. 6 in.				1
Orthodox street, northeast corner of Jefferson	23	6	17 ft. 1 in.				1
Oxford street, northeast corner of Jefferson	23	6	17 ft. 6 in.				1
Paul street, southwest corner of Church	23	6	13 ft.				1
Pike street, northeast corner of Fairhill	25	6	19 ft. 4 in.				1
Pike street, northeast corner of Reese	25	6	15 ft.				1
Pike street, northeast corner of Sixth	25	6	21 ft. 7 in.				1
Rachel street, east side, 65 feet 6 inches south of south house line of Poplar	16	4	9 ft. 8 in.		1		
Randolph street, west side, 208 feet north of north house line of Thompson	17	6	11 ft. 1 in.		1		
Reese street, southeast corner of Clearfield	25	6	13 ft.				1
Richmond street, northeast corner of Ross	18	6	9 ft. 9 in.				1
Richmond street, southeast side, 138 feet northeast of northeast house line of Allegheny avenue	25	6	18 ft. 3 in.			1	

NEW FIRE HYDRANTS—THIRD DISTRICT—*Continued*..

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Richmond street,	northwest side, 56 feet 6 inches northeast of northeast house line of Kirkbride	25	6	18 ft.	.....	1		
Rosehill street,	northeast corner of Somerset	25	6	16 ft. 7 in.	.....	.....	.....	1
Ross street,	northwest corner of Ireland	18	6	7 ft. 3 in.	.....	.....	.....	1
Second street,	east side, south house line of York	19	6	20 ft.	.....	.....	1	
Shackamaxon street,	southwest corner of Wildey	18	6	19 ft. 3 in.	.....	.....	.....	1
Sixth street,	west side, 251 feet north of north house line of Pike	25	12	13 ft. 10 in.	.....	1		
Somerset street,	northeast corner of Oram	25	6	16 ft. 1 in.	.....	.....	.....	1
St. Bernard street,	north side, east house line of American	19	6	9 ft.	1			
Summer street,	southeast corner of Fremont	25	6	8 ft. 10 in.	.....	.....	.....	1
Susquehanna avenue,	northeast corner of Richmond	18	6	17 ft. 2 in.	.....	.....	.....	1
Susquehanna avenue,	southwest side, 63 feet southeast of southeast house line of Girard avenue	18	6	14 ft. 8 in.	.....	1		
Susquehanna avenue,	southeast corner of Bodine	19	6	17 ft. 5 in.	.....	.....	.....	1
Tacony street,	west side, 682 feet 7 inches south of south house line of Church	23	6	12 ft.	1			
Tacony street,	west side, 331 feet south of south house line of Church	23	6	14 ft. 6 in.	1			
Tacony street,	east side, 386 feet north of north house line of Church	23	6	14 ft. 10 in.	1			
Tacony road,	northwest side, 200 feet northeast of northeast house line of Tucker	23	6	20 ft.	.....	1		

New Fire Hydrants—Third District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Taylor street, east corner of Emerald	31	4	13 ft. 3 in.	.....	.....	.....	1
Tioga street, north side, east house line of Philip	25	6	14 ft.	.....	.....	1	
Third street, southwest corner of Susquehanna avenue	19	6	19 ft. 2 in.	.....	.....	.....	1
Tusculum street, north side, 109 feet 9 inches west of west house line of Garnet	25	6	8 ft. 4 in.	.....	1		
Tusculum street, northeast corner of Somerset	25	6	17 ft. 3 in.	.....	.....	1	
Tusculum street, northeast side, 61 feet 6 inches southeast of southeast house line of Leamy	25	6	11 ft. 7 in.	.....	.....	1	
Tusculum street, northeast corner of Leamy	25	6	12 ft.	.....	.....	.....	1
Venango street, north side, 50 feet west of west house line of Myrtle	25	6	18 ft.	.....	1		
Virginia street, south side, 98 feet east of east house line of Amber	25	6	8 ft. 4 in.	1			
Warren street, south side, east house line of Richmond	18	4	14 ft.	.....	.....	1	
Weisser street, south side, 195 feet west of west house line of Thompson	25	6	9 ft. 10 in.	.....	1		
Wildey street, southeast corner of Montgomery	18	6	15 ft. 5 in.	.....	.....	.....	1
Willig's avenue, 144 feet west of west house line of Palmer, on dead end	18	6	.....	.....	1		
Willow street, east side, 256 feet north of north house line of Wakeling	23	6	17 ft.	1			
York street, northwest corner of Richmond	18	6	16 ft. 7 in.	.....	.....	.....	1
York street, southeast corner of Palethorp	19	6	15 ft. 8 in.	.....	.....	.....	1

NEW FIRE HYDRANTS—THIRD DISTRICT—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
York street,	northeast corner of Lawrence	19	6	15 ft. 10 in.	.....	.....	.....	1
York street,	southeast corner of Marshall	19	6	15 ft. 1 in.	.....	.....	.....	1
York street,	southeast corner of Germantown road	19	6	16 ft. 4 in.	.....	.....	.....	1
Totals		.....	.....	2,156ft. 8 in.	10	22	28	86

New Fire Hydrants—Continued.

EOURTH DISTRICT.

Street.	Location.	Ward.	Size of Main in Inches.	CONNECTION.	STYLE.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Albrecht street,	south side, 109 feet 6 inches west of west house line of Twenty-eighth	28	6	6 ft. 6 in.	.....	1		
Baltz street,	northeast corner of Thirty-first	29	6	13 ft.	.....	.....	.....	1
Beacon street,	east side, south house line of Montgomery avenue	29	6	9 ft. 8 in.	.....	1	"	
Berks street,	northeast corner of Seventeenth	28	6	7 ft.	.....	.....	.....	1
Biddle street,	southwest corner of Quarry Court	15	6	9 ft. 6 in.	.....	.....	.....	1
Broad street,	southeast corner of Olive	14	20	16 ft.	.....	.....	.....	1
Broad street,	southeast corner of Brown	14	20	16 ft.	.....	.....	.....	1
Broad street,	sontheast corner of Atmore	14	4	8 ft. 10 in.	.....	.....	.....	1
Broad street,	east side, north house line of Parrish	14	20	17 ft.	.....	.....	1	
Broad street,	east side, north house line of Dauphin	28	6	7 ft.	.....	.....	1	
Broad street,	west side, north house line of Dauphin	28	6	11 ft. 2 in.	.....	.....	1	
Broad street,	west side, 2 feet 6 inches north of north house line of York	28	30	25 ft.	.....	.....	1	
Broad street,	west side, south house line of Cumberland	28	6	12 ft.	.....	.....	1	
Broad street,	southeast corner of Cumberland	28	6	13 ft.	.....	.....	.....	1
Broad street,	east side, 163 feet north of north house line of Huntingdon	28	6	15 ft.	.....	.....	1	

New Fire Hydrants—Fourth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Broad street, west side, 271 feet north of north house line of Huntingdon		28	6	18 ft.	.....	.....	1	
Broad street, east side, north house line of Lehigh avenue		28	12	22 ft.	.....	.....	1	
Brown street, southeast corner of Judson		15	6	17 ft.	.....	.....	1	
Brown street, southeast corner of Inquirer		14	6	17 ft. 6 in.	.....	.....	1	
Brown street, southwest corner of Twentieth		15	6	20 ft. 8 in.	.....	.....	.....	1
Buttonwood street, southwest corner of Tenth		14	6	17 ft. 6 in.	.....	.....	.....	1
Buttonwood street, north side, 107 feet east of east house line of Eleventh		14	6	15 ft. 6 in.	.....	1		
Buttonwood street, southeast corner of Eleventh		14	6	18 ft.	.....	.....	.....	1
Buttonwood street, southwest corner of Ridge avenue		14	6	17 ft. 6 in.	.....	.....	1	
Buttonwood street, north side, 30 feet east of east house line of Fifteenth		15	4	12 ft.	.....	1		
Buttonwood street, northeast corner of Seventeenth		15	6	12 ft. 6 in.	.....	.....	.....	1
Cambridge street, southwest corner of Twenty-eighth		29	6	13 ft.	.....	.....	.....	1
Carlton street, southeast corner of Twenty-second		15	6	8 ft.	.....	1		
Clarence street, southwest corner of Twelfth		28	6	13 ft. 6 in.	.....	.....	1	
Corinthian avenue, west side, opposite the centre of Cambridge		29	6	20 ft. 11 in.	.....	.....	1	
Corinthian avenue, southwest corner of Girard avenue		29	6	22 ft.	.....	.....	1	

New Fire Hydrants—Fourth District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Como street, north side, east house line of Eleventh	28	6	3 ft. 6 in.				
Dauphin street, southeast corner of Sixteenth	28	6	18 ft. 6 in.	.....	.....	.....	1
Diamond street, northeast corner of Nineteenth	28	6	3 ft. 8 in.	.....	.....	1	
Diamond street, southwest corner of Nineteenth	28	6	3 ft.	.....	.....	.....	1
Diamond street, northeast corner of Twentieth	28	6	3 ft. 2 in.	.....	.....	1	
Edgely street, north side, 142 feet west of west house line of Seventeenth	28	6	11 ft.	.....	1		
Eighteenth street, southwest corner of Hamilton	15	6	21 ft. 7 in.	.....	.....	1	
Eighteenth street, southwest corner of Spring Garden	15	6	18 ft. 6 in.	.....	.....	.....	1
Eighteenth street, southeast corner of North	15	6	17 ft. 10 in.	.....	.....	.....	1
Eighteenth street, southeast corner of Olive	15	6	17 ft.	.....	.....	.....	1
Eleventh street, northeast corner of Vernon	14	10	17 ft.	.....	.....	1	
Etting street, north side, 176 feet 5 inches southeast of southeast house line of Sedgeley	28	6	6 ft.	.....	1		
Fairmount avenue, south side, 1 foot west of west house line of Twentieth	15	16	11 ft. 8 in.	.....	.....	1	
Fairmount avenue, southeast corner of Twenty-first	15	6	17 ft.	.....	.....	.....	1
Fairmount avenue, south side, 134 feet 8 inches east of east house line of Twenty-second	15	16	11 ft. 7 in.	.....	1		
Fifteenth street, southeast corner of Hamilton	15	6	20 ft. 6 in.	.....	.....	.....	1

New Fire Hydrants—Fourth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Fifteenth street, northwest corner of Buttonwood		15	6	13 ft. 6 in.	.....	.....	.....	1
Fontaine street, southwest corner of Eighteenth		28	6	20 ft. 3 in.	.....	.....	1	
French street, 178 feet 6 inches east of east house line of Eighteenth		28	6	12 ft.	.....	1		
Girard avenue, northeast corner of Carlisle		29	6	20 ft. 6 in.	.....	.....	.....	1
Green street, southwest of corner of Eighteenth		15	6	22 ft. 6 in.	.....	.....	.....	1
Green street, southwest corner of Thirteenth		14	6	20 ft. 10 in.	.....	.....	.....	1
Hagert street, northeast corner of Twenty-seventh		28	6	19 ft. 6 in.	.....	.....	.....	1
Harold street, south side, east house line of Twenty-sixth		28	6	12 ft.	.....	.....	1	
Hamilton street, northeast corner of Seventeenth		15	6	18 ft. 1 in.	.....	.....	.....	1
Huntingdon street, southwest corner of Carlisle		28	6	16 ft.	.....	.....	.....	1
Jefferson street, southwest corner of Fawn		20	6	17 ft. 6 in.	.....	.....	.....	1
Jefferson street, southwest corner of Seventeenth		**29**	**6**	**21 ft. 2 in.**	.....	.....	.....	
Lambert street, southwest corner of Susquehanna avenue		**28**	**6**	**18 ft. 5 in.**	.....	.....	.....	**1**
Lehigh avenue, north side, 186 feet west of west house line of Twelfth		**28**	**6**	**14 ft.**	.....	.....	**1**	
Lehigh avenue, south side, west house line of Park avenue		**28**	**6**	**15 ft. 6 in.**	.....	.....	**1**	
Lehigh avenue, north side, west house line of Park avenue		**28**	**6**	**8 ft. 6 in.**	.....	.....	**1**	

NEW FIRE HYDRANTS—FOURTH DISTRICT—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 inch.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Linden square, southeast corner of Thirty-first		28	6	18 ft. 6 in.	.....	.....	.....	1
Logan street, north side, 54 feet 7 inches east of east house line of Park avenue		28	6	9 ft. 6 in	.....	.....	1	
Maple street, west side, 223 feet north of north house line of Susquehanna avenue		28	6	6 ft. 6 in.	.....	.....	1	
Marshall street, southeast corner of Wood		13	6	20 ft. 6 in.	.....	.....	.....	1
Marshall street, east side, 92 feet north of north house line of Wood		13	6	13 ft. 9 in.	.....	1		
Marshall street, northwest corner of Callowhill		13	6	11 ft. 10 in.	.....	.....	.....	1
Marshall street, southwest corner of Noble		13	6	17 ft. 6 in.	.....	.....	.....	1
Marshall street southwest corner of Spring Garden		13	6	18 ft.	.....	.....	.....	1
Marshall street, southwest corner of Germantown avenue		28	6	3 ft. 3 in.	.....	.....	.....	1
Master street, north side, west house line of Eighteenth		29	6	14 ft. 6 in.	.....	1		
Master street, south side, east house line of Nineteenth		29	6	13 ft. 2 in.	.....	1		
Marston street, northeast corner of Oxford		29	6	12 ft. 10 in.	.....	.....	.....	1
Marston street, southwest corner of Susquehanna avenue		28	6	10 ft	.....	.....	1	
Montgomery avenue, southeast corner of Nineteenth		29	6	22 ft.	.....	.....	.....	1
Mt. Vernon street, southwest corner of Twelfth		14	6	21 ft.	.....	.....	.....	1
Nevada street, north side, 28 feet east of east house line of Eleventh		28	6	7 ft. 6 in.	.....	1		

New Fire Hydrants—Fourth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No, 1.	New, No. 2.	New, No. 3.
Newkirk street,	northwest corner of Stiles	29	6	13 ft.	.....	.....	1	
Nicholas street,	northwest corner of Twentieth	29	6	11 ft. 6 in.	.....	.....	1	
Nineteenth street,	southeast corner of Brandywine	15	6	17 ft. 11 in.	.....	.....	1	
Norris street,	southwest corner of Twenty-second	28	6	9 ft. 9 in.	.....	.....	.....	1
Ontario street,	northeast corner of Poplar	20	6	12 ft.	.....	.....	.....	1
Oxford street,	southeast corner of Tenth	20	6	16 ft.	.....	.....	.....	1
Oxford street,	northwest corner of Ridge avenue	29	6	26 ft. 6 in.	.....	.....	.....	1
Oxford street,	northeast corner of Twenty-second	29	6	17 ft.	.....	.....	.....	1
Oxford street,	northeast corner of Bailey	29	6	16 ft. 4 in.	.....	.....	.....	1
Park avenue,	north side, 369 feet west of west house line of Seventeenth	28	6	9 ft.	.....	1		
Parrish street,	southeast corner of Twelfth	14	6	24 ft.	.....	.....	.....	1
Parrish street,	northeast corner of Thirteenth	14	6	16 ft.	.....	.....	.....	1
Parrish street,	southwest corner of Nineteenth	15	6	17 ft. 6 in.	.....	.....	1	
Parrish street,	southeast corner of Capitol	15	6	16 ft.	.....	.....	.....	1
Parrish street,	southwest corner of Twentieth	15	6	17 ft.	.....	.....	.....	1
Parrish street,	south side, 54 feet 6 inches east of east house line of West	15	6	14 ft. 6 in.	.....	1		

NEW FIRE HYDRANTS—FOURTH DISTRICT—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Parrish street,	southwest corner of Corinthian avenue	15	8	16 ft. 6 in.	.....	.....	.....	1
Pearl street,	southeast corner of Twenty-fourth	15	6	10 ft.	.....	.....	.....	1
Perot street,	northwest corner of Twenty-fifth	15	6	17 ft.	.....	.....	.....	1
Philadelphia street,	west side, 60 feet north of north house line of Susquehanna avenue	28	6	11 ft. 6 in.	.....	.....	1	
Poplar street,	southeast corner of Corinthian avenue	15	6	22 ft.	.....	.....	.....	1
Poplar street,	south side, 359 feet 7 inches east of east house line of Twenty-second	15	30	7 ft. 7 in.	.....	.....	1	
Poplar street,	northeast corner of Twenty-second	29	6	15 ft. 4 in.	.....	.....	.....	1
Sartain street,	east side, 54 feet 6 inches south of south house line of Huntingdon	28	6	8 ft. 4 in.	.....	.....	1	
Seventh street,	southeast corner of Germantown aveuue	28	6	18 ft. 6 in.	.....	.....	.....	1
Seventh street,	southeast corner of Susquhanna avenue	20	6	15 ft. 2 in.	.....	.....	.....	1
Seventeenth street,	northeast corner of Brandywine	15	6	18 ft. 6 in.	.....	.....	.....	1
Seventeenth street,	southeast corner of North	15	6	21 ft.	.....	.....	.....	1
Seventeenth street,	southeast corner of Seybert	29	6	21 ft.	.....	.....	.....	1
Seventeenth street,	southwest corner of Master	29	6	21 ft. 8 in.	.....	.....	1	
Seventeenth street,	east side, 136 feet south of south house line of Montgomery avenue	29	6	14 ft. 6 in.	.....	1		
Seventeenth street,	west side, 250 feet south of south house line of Dauphin	28	6	14 ft. 9 in.	.....	.....	1	

NEW FIRE HYDRANTS—FOURTH DISTRICT—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Seventeenth street, southeast corner of Dauphin		28	6	19 ft. 7 in.	.....	.....	.....	1
Seventeenth street, southeast corner of York		28	6	22 ft.	.....	.....	.....	1
Seybert street, northeast corner of Twenty-fifth		29	6	17 ft. 6 in.	.....	.....	.....	1
Sixteenth street, northeast corner of Wallace		29	6	15 ft.	.....	1		
Somerset street, southeast corner of Twelfth		28	6	16 ft. 6 in.	.....	.....	.....	1
Susquehanna avenue, southeast corner of Seventeenth street		28	6	17 ft. 10 in.	.....	.....	.....	1
Susquehanna avenue, southeast corner of Eighteenth street		28	6	18 ft. 8 in.	.....	.....	.....	1
Tenth street, southwest corner of Green		14	6	22 ft.	.....	.....	.....	1
Tenth street, southwest corner of Susquehanna avenue		20	6	15 ft. 6 in.	.....	.....	.....	1
Twelfth street, northeast corner of Melon		14	6	16 ft. 6 in.	.....	.....	.....	1
Twelfth street, northeast corner of Olive		14	6	17 ft. 6 in.	.....	.....	1	
Twelfth street, northeast corner of Brown		14	6	20 ft.	.....	.....	.....	1
Twelfth street, southeast corner of Myrtle		14	6	17 ft.	.....	.....	1	
Twelfth street, northeast corner of Harmer		14	6	7 ft.	.....	.....	1	
Twelfth street, southwest corner of Poplar		14	6	14 ft.	.....	.....	.....	1
Twelfth street, northeast corner of Cumberland		28	6	20 ft.	.....	.....	.....	1

New Fire Hydrants—Fourth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Twelfth street, west side, north house line of Lehigh avenue		28	6	13 ft. 6 in.	.....	.....	1	
Thirteenth street, northeast corner of Ogden		14	6	19 ft.	.....	.....	.....	1
Thirteenth street, southeast corner of Huntingdon		28	6	23 ft. 6 in.	.....	.....	.....	1
Thirteenth street, southwest corner of Lehigh avenue		28	6	13 ft. 6 in.	.....	.....	.....	1
Twentieth street, northwest corner of Carlton		15	6	17 ft.	.....	.....	.....	1
Twentieth street, west side, south house line of Pennsylvania avenue		15	6	14 ft. 6 in.	.....	.....	1	
Twentieth street, east side, south house line of Earp		15	6	14 ft. 6 in.	.....	1		
Twentieth street, southeast corner of Brandywine		15	6	17 ft. 10 in.	.....	.....	.....	1
Twentieth street, northeast corner of Poplar		29	6	17 ft.	.....	.....	.....	1
Twentieth street, southeast corner of Girard avenue		29	6	16 ft. 6 in.	.....	.....	.....	1
Twenty-first street, southwest corner of Green		15	6	21 ft. 9 in.	.....	.....	.....	1
Twenty-first street, northeast corner of Oxford		29	6	16 ft. 6 in.	.....	.....	.....	1
Twenty-second street, northwest corner of Redner		29	6	12 ft.	.....	.....	.....	1
Twenty-third street, southwest corner of Hamilton		15	6	15 ft. 6 in.	.....	.....	.....	1
Twenty-fifth street, east side, south house line of Brandywine		15	6	8 ft.	.....	.....	1	
Twenty-sixth street, southwest corner of Brown		15	6	16 ft.	.....	.....	.....	1

New Fire Hydrants—Fourth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Twenty-seventh street, southwest corner of Mt. Pleasant		29	6	17 ft.				1
Twenty-seventh street, east side, 96 feet 6 inches horth of north house line of Thompson		29	6	14 ft. 6 in.			1	
Twenty-seventh street, southeast corner of Dauphin		28	6	16 ft.				1
Twenty-ninth street, southeast corner of Master		29	8	22 ft. 7 in.				1
Twenty-ninth street, south house line of Girard avenue		29	10	35 ft. 8 in.			1	
Twenty-ninth street, east side, north house line of Diamond		28	6	23 ft.			1	
Thirtieth street, northeast corner of Susquehanna avenue		28	12	17 ft.				1
Thirty-fifth street, southwest corner of Clearfield		28	6	16 ft. 2 in.				1
Thirty-fifth street, east side, 19 feet 2 inches south of south house line of Cemetery		28	6	14 ft. 5 in.			1	
Thompson street, north side, east house line of Seventeenth		29	4	6 ft. 6 in.		1		
Waldron street, northwest corner of Thirtieth		29	6	10 ft. 4 in.				1
Waldron street, on dead end of 6-inch pipe 338 feet 6 inches west of west house line of Thirtieth		29	6			1		
Wallace street, southwest corner of Twelfth		14	6	21 ft.				1
Wallace street, southeast corner of Seventeenth		15	6	16 ft. 1 in.				1
Wallace street, southwest corner of Nineteenth		15	6	17 ft.				1
West street, southwest corner of Parrish		15	6	18 ft. 6 in.				1

NEW FIRE HYDRANTS—FOURTH DISTRICT—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 inch.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Westmont street, south side, 169 feet east of east house line of Thirtieth		28	6	8 ft.	.....	1		
Woodstock street, northwest corner of Susquehanna avenue		28	6	18 ft.	.....	.....	.....	1
Total		.....	.....	2,487	.....	21	47	92

New Fire Hydrants—Continued.

Fifth District.

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Cedar street, southeast side, 26 feet northeast of northeast house line of Terrace		21	6	14 ft. 6 in.	.....	1		
Dexter, northeast side, 303 feet northwest of northwest house line of Lyceum avenue		21	6	14 ft. 6 in.	.....	.....	.....	1
Fleeson street, south corner of Tibben		21	6	12 ft.	.....	.....	1	
Fleeson street, north corner of Pechin		21	6	12 ft.	.....	1		
Lyceum avenue, north corner of Mitchell		21	6	17 ft.	.....	.....	1	
Manayunk avenue, opposite centre of Cedar		21	6	14 ft. 6 in.	.....	.....	1	
Manayunk avenue, south corner Penn		21	6	22 ft.	.....	.....	1	
Martin street, northeast corner of Manayunk avenue		21	6	11 ft. 6 in.	.....	1		
Pechin street, north corner of Martin		21	6	18 ft.	.....	.....	1	
Pechin street, southwest side, 13 feet 9 inches northwest of northwest house line of Rector		21	6	11 ft. 6 in.	.....	.....	1	
Penn street, northwest side, 22 feet southwest of southwest house line of Ashland		21	6	14 ft. 6 in.	.....	.....	1	
Roxborough avenue, northwest side, 26 feet 6 inches southwest of southwest house line of Freeland avenue		21	6	18 ft. 6 in.	.....	.....	.....	1
Spencer street, southeast side, 6 feet southwest of southwest house line of Dobson		28	6	14 ft. 6 in.	.....	1		
Spring street, northwest side, 14 feet 2 inches northeast of northeast house line of Wood		21	6	7 ft. 6 in.	.....	.....	1	
Spring street, southeast side, 420 feet northeast of northeast house line of Wood		21	6	7 ft. 6 in.	.....	.....	1	
Wood street, northwest corner of Mulberry		21	6	12 ft.	.....	.....	1	
Totals		.....	.....	222 ft.	.....	4	10	2

New Fire Hydrants—Continued.

SIXTH DISTRICT.

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Bouvier street, southwest corner of Pacific		28	6	7 ft.	.....	.....	1	
Camac street, southwest corner of Pike		25	6	9 ft. 7 in.	.....	.....	.....	1
Carpenter street, northwest side, 6 feet 3 inches southwest of southwest house line of Cresheim		22	6	15 ft. 7 in.	.....	.....	1	
Carpenter street, west corner of McCallum		22	6	26 ft. 4 in.	.....	.....	.....	1
Carpenter street, northwest side, 422 feet northeast of northeast house line of Cresheim road		22	6	13 ft. 3 in.	.....	1		
Centre street, north corner of Hancock		22	6	12 ft. 6 in.	.....	.....	.....	1
Chelten ave., southeast side, 24 feet 10 inches northeast of northeast house line of Willow ave		22	6	24 ft. 2 in.	.....	1		
Chelten avenue, northwest side, 19 feet 3 inches southwest of southwest house line of Wilson		22	6	27 ft. 3 ft.	.....	.....	1	
Chelten avenue, northwest side, 9 feet 2 inches northeast of northeast house line of Wissahickon avenue		22	6	21 ft. 7 in.	1			
Chestnut Hill avenue, northwest side, 85 feet southwest of southwest house line of Germantown ave		22	6	15 ft.	.....	.....	1	
Chestnut Hill avenue, southeast side, 62 feet 4 inches southwest of southwest house line of Twenty-seventh		22	6	14 ft. 6 in.	.....	1		
Chestnut Hill avenue, southeast side, 171 feet 9 inches southwest of southwest house line of Twenty-eighth		22	6	14 ft. 6 in.	.....	1		
Chestnut Hill avenue, southeast side, 2 feet 4 inches southwest of southwest house line of Twenty-ninth		22	6	14 ft.	.....	.....	1	

New Fire Hydrants—Sixth District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Chestnut Hill avenue, northwest side, 4 feet southwest of southwest house line of Crefeldt	22	6	15 ft. 6 in.	.....	.....	1	
Chew street, south corner of Price	22	6	23 ft.	.....	.....	.....	1
Chew street, north corner of Tulpehocken	22	6	21 ft.	.....	.....	.....	1
Chew street, northeast side, 9 feet northwest of northwest house line of Horter	22	6	21 ft. 6 in.	.....	.....	1	.....
Clothier street, southeast side, 200 feet northeast of northeast house line of Germantown avenue	25	6	9 ft. 1 in.	.....	1	.....	.....
Crowson street, southwest side, 218 feet 4 inches northwest of northwest house line of Horter	22	6	13 ft. 6 in.	.....	1	.....	.....
Corr street, southeast corner of Seventeenth	28	6	9 ft.	.....	.....	.....	1
Cumberland street, north corner of Coulter	22	6	17 ft. 6 in.	.....	.....	.....	1
Duval street, northwest side, 253 feet 10 inches southwest of southwest house line of Morton	22	6	15 ft. 2 in.	.....	1	.....	.....
Earlham street, east corner of Pulaski	22	6	18 ft. 9 in.	.....	.....	.....	1
Eighteenth street, west side, south house line of Atlantic	28	6	14 ft. 4 in.	.....	1	.....	.....
Fairfax street, east corner of Center	22	8	22 ft. 6 in.	.....	.....	.....	1
Germantown avenue, east corner of Herman	22	6	30 ft. 1 in.	.....	.....	.....	1
Hancock street, northeast side, 2 feet southeast of southeast house line of Walnut lane	22	6	16 4 ft. in.	.....	.....	1	.....
Hancock street, southeast corner of Herman	22	6	18 ft. 3 in.	.....	.....	.....	1
Horter street, northwest side, 228 feet 8½ inches northeast of northeast house line of Musgrove	22	6	15 ft. 5 in.	.....	.....	1	.....

New Fire Hydrants—Sixth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Itschner street, north side, 308 feet west of west house line of Nineteenth		22	6	13 ft.	1	.....	.....	.....
Lehman street, on dead end of 6-inch main, 111 feet 4 inches southwest of southwest house line of Wayne		22	6	.....	1	.....	.....	.....
Louden street, northwest side, 348 feet 9 inches southwest of southwest house line of Germantown ave		22	6	13 ft. 6 in.	.....	1	.....	.....
Mather street, southeast corner of Ontario		28	6	15 ft. 8 in.	.....	.....	.....	1
Mather street, west side, 189 feet 8 inches south of southwest house line of Tioga		28	6	14 ft.	.....	1	.....	.....
Meadowbrook avenue, southwest side, 1,242 feet 10 inches northwest of southeast house line of Stenton avenue		22	6	13 ft. 9 in.	1	.....	.....	.....
Mt. Airy avenue, north corner of Boyer		22	6	5 ft. 10 in.	.....	.....	.....	1
Mt. Pleasant avenue, northwest side, 16 feet 4 inches southwest of southwest house line of Boyer		22	6	16 ft.	1	.....	.....	.....
Morris street, east corner of School lane		22	6	18 ft.	.....	.....	.....	1
Morris street, northwest corner of Chelten avenue		22	6	18 ft. 5 in.	.....	.....	.....	1
Morris street, northeast side, 35 feet northeast of northeast house line of Penn		22	6	16 ft. 9 in.	.....	1	.....	.....
Morris street, south corner of Coulter		22	6	18 ft. 8 in.	.....	.....	.....	1
Morton street, northwest corner of Haines		22	6	11 ft. 1 in.	.....	.....	.....	1
Nineteenth street, southeast corner of Westmoreland		28	6	11 ft. 8 in.	.....	.....	1	.....
Ontario street, south side, west house line of Smedley		28	6	14 ft. 5 in.	.....	.....	1	.....

New Fire Hydrants—Sixth District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.			
			6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Penn street, southeast side, 165 feet 2 inches southwest of southwest house line of Chew	22	6	9 ft. 1 in.	.....	1	.....	.....
Penn street, north corner of Peale	22	6	23 ft. 4 in.	.....	.....	.....	1
Pleasant street, northwest side, 311 feet 10 inches northeast of northeast house line of Musgrove	22	6	13 ft. 4 in.	.....	1	.....	.....
Pomona terrace, east corner of Morton	22	6	16 ft. 3 in.	.....	.....	.....	1
Pomona terrace, northwest side, 385 feet 3 inches northeast of northeast house line of Hancock	22	6	16 ft.	.....	1		
Pomona terrace, southeast corner of Hancock	22	6	17 ft.	.....	.....	.....	1
Pulaski avenue, west corner of Penn	22	6	21 ft. 2 in.	.....	.....	.....	1
Roumfort street, northwest side, 462 feet 4 inches northeast of northeast house line of Ardleigh	22	6	19 ft. 4 in.	.....	1		
Roumfort street, southeast side, 5 feet 8 inches southwest of southwest house line of Crittenden	22	6	18 ft. 4 in.	.....	1		
School lane, north corner of Wayne	22	6	13 ft. 1 in.	.....	.....	.....	1
Seventeenth street, west side, southwest corner of Erie avenue	28	6	19 ft.	.....	.....	.....	1
Sharpnack street, west corner of Chew	22	6	14 ft. 6 in.	.....	.....	.....	1
Sharpnack street, north corner of Musgrove	22	6	16 ft. 9 in.	.....	.....	.....	1
Smedley street, northwest corner of Westmoreland	28	6	14 ft.	.....	.....	.....	1
Stenton avenue, northeast corner of Mill	22	6	21 ft.	.....	.....	.....	1
Stenton avenue, southwest corner of Sprague	22	6	16 ft.	.....	.....	.....	1

New Fire Hydrants—Sixth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Stenton avenue, southeast corner of Spencer		22	6	16 ft.	.....	.....	.....	1
Stenton avenue, northeast side, northwest house line of Sullivan		22	6	17 ft, 4 in.	.....	.....	1	
Stenton avenue, northeast side, northwest house line of Godfrey		22	6	17 ft. 4 in.	.....	.....	.....	1
St. Vincent place, on dead end, 150 feet southwest of southwest house line of Chew		22	6	.....	1			
Thirteenth street, east side, 1 foot 4 inches south of south house line of Pike		25	6	14 ft.	.....	1		
Thirty-first street, southwest side, southeast house line of Abington		22	6	14 ft. 7 in.	1			
Twentieth street, east side, 25 feet north of south house line of Belleview		22	6	14 ft. 5 in.	.....	.....	1	
Twenty-second street, west side, north house line of Park		22	6	17 ft. 4 in.	.....	1		
Twenty-second street, northwest corner of Allegheny avenue		28	6	18 ft. 9 in.	.....	.....	.....	1
Twenty-third street, northeast side, 415 feet southeast of southeast house line of Southampton ave		22	6	20 ft. 6 in.	.....	1		
Twenty-third street, northwest corner of Southampton avenue		22	6	16 ft. 7 in.	.....	.....	.....	1
Tioga street, north side, opposite centre of Park		28	6	14 ft. 1 in.	.....	1		
Uber street, west side, 265 feet 2 inches north of north house line of Westmoreland		28	6	11 ft. 2 in.	1			
Upsal street, south corner of Germantown avenue		22	10	25 ft. 7 in.	.....	.....	.....	1
Upsal street, southeast side, 4 feet northeast of northeast house line of Berdan		22	10	23 ft. 3 in.	.....	.....	1	
Upsal street, southwest corner of Emlen		22	10	27 ft. 6 in.	.....	.....	1	

NEW FIRE HYDRANTS—SIXTH DISTRICT—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	CONNECTION.	STYLE.			
				6 in.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Washington lane	northwest side, 320 feet northeast of northeast house line of Green	22	6	16 ft. 8 in.	1			
Wayne street	east corner of Chelton avenue	22	6	19 ft.	.....	.....	.....	1
Wayne street	southwest side, 9 feet 4 inches northwest of northwest house line of Harvey	22	6	22 ft.	.....	.....	.....	1
Wilson street	southwest side, 118 feet 3 inches southeast of southeast house line of Haines	22	6	17 ft. 7 in.	.....	1		
Wissahickon avenue	northeast side, 2 feet 1 inch southwest of southwest house line of Lehman	22	6	14 ft. 9 in.	1			
Woodbine street	northwest side, 5 feet southwest of southwest house line of Bloyd	22	6	15 ft. 7 in.	.....	1		
Woodbine street	southeast side, 7 feet southwest of southwest house line of Boyer	22	6	11 ft. 7 in.	.....	1		
Wyoming street	northeast corner of Germantown avenue	22	6	11 ft. 1 in.	.....	.....	.....	1
Totals		.....	.....	1,356 ft. 9 in.	10	23	15	36

FIRE HYDRANTS RENEWED.

First District.

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.					
			6 in.	Removed.			Replaced by		
				Old.	No. 2.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Atherton street, east side, 30 feet south of south house line of Marriott	2	3	5 ft. 6 in.	1	.....	.....	.....	1		
Bainbridge street, north side, 115 feet west of west house line of Second	4	6	14 ft. 8 in.	1	.....	.....	.....	.....	1	
Broad street, west side, 137 feet south of south house line of Reed	26	6	3 ft. 6 in.	1	.....	.....	.....	1		
Carpenter street, south side, 144 feet east of east house line of Third	2	6	15 ft.	1	.....	.....	.....	1		
Catharine street, north side, 159 feet east of east house line of Thirteenth	2	6	15 ft. 6 in.	1	.....	.....	.....	1		
Christian street, north side, 9 feet west of west house line of Twenty-second	30	6	.....	1	.....	.....	1			
Clare street, west side, 117 feet south of south house line of Carpenter	2	6	4 ft. 6 in.	1	.....	.....	.....	1		
Delaware avenue, west side, 8 feet north of north house line of Davis Landing	3	6	.....	1	.....	.....	1			
Dickinson street, north side, 115 feet west of west house line of Passyunk ave	26	6	15 ft.	1	.....	.....	.....	.....	1	
Dickinson street, north side, 119 feet east of east house line of Sixth	1	16	7 ft.	1	.....	.....	.....	.....	1	
Dickinson street, north side, 201 feet west of west house line of Sixth	1	16	11 ft.	1	.....	.....	.....	.....	1	
Dickinson street, north side, 205 feet west of west house line of Eighth	1	16	7 ft.	1	.....	.....	.....	.....	1	
Doak street, east side, 233 feet 6 inches south of south house line of Bainbridge	30	6	9 ft.	1	.....	.....	.....	1		

Fire Hydrants Renewed—First District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.						
				6 in.	Removed.			Replaced by			
					Old.	No. 2.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Dudley street, south side, 58 feet east of east house line of Ninth		1	4		1			1			
Eighth street, east side, 62 feet north of north house line of Fitzwater		4	10		1			1			
Eleventh street, east side, 168 feet south of south house line of Fitzwater		3	4		1			1			
Ellsworth street, south side, 149 feet west of west house line of Twelfth		26	6	14 ft.	1					1	
Emily street, north side, 157 feet 3 inches east of east house line of Twelfth		1	6	4 ft. 6 in.	1				1		
Federal street, north side, 185 feet west of west house line of Seventh		2	6	14 ft. 3 in.	1				1		
Front street, east side, 161 feet south of south house line of Tasker		1	6	17 ft. 6 in.	1					1	
Front street, southeast corner of Mead		3	6	11 ft. 10 in.	1					1	
Jackson street, west side, 96 feet south of south house line of Washington ave.		2	4	4 ft. 6 in.	1				1		
Mechanic street, east side, 101 feet south of south house line of Carpenter		2	6	4 ft.	1				1		
Moore street, north side, 20 feet east of east house line of Broad		26	6		1			1			
Mayamensing avenue, southeast side, 56 feet north of north house line of Greenwich		1	16		1			1			
Ovington street, east side, 102 feet 7 inches south of south house line of South		4	3	4 ft.	1				1		
Owen street, south side, 168 feet east of east house line of Sixth		1	4		1			1			

Fire Hydrants Renewed—First District—*Continued.*

Street.	Location.	Ward.	Size of Main in Inches.	Connection.	Style.						
				6 in.	Removed.			Replaced by			
					Old.	No. 2.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Latona street, north side, 5 feet 6 inches east of east house line of Thirty-first		26	6	.....	1	.....	.....	1			
Passyunk avenue, northwest side, 20 feet northeast of east house line of Broad		26	6	.....	1	.....	.....	1			
Passyunk avenue, southeast side, 13 feet 4 inches southwest of south house line of Dickinson		1	6	15 ft. 4 in.	1	.....	.....	.....	.....	1	
Queen street, north side, 25 feet east of east house line of Front		26	6	.....	1	.....	.....	1			
Reed street, north side, 62 feet 8 inches east of east house line of Fourth		1	6	12 ft. 6 in.	1	.....	.....	.....	1		
Reed street, north side, 198 feet east of east house line of Ninth		1	6	.....	1	.....	.....	1			
Starr street, east side, 36 feet south of south house line of McKean		1	4	3 ft.	1	.....	.....	.....	1		
Snyder avenue, north side, 22 feet east of east house line of Sixth		1	6	.....	1	.....	.....	1			
Swanson street, east side, 3 feet north of north house line of Catharine		1	6	.....	1	.....	.....	1			
Sydmouth street, west side, opposite centre of Wyatt		2	4	.....	1	.....	.....	1			
Third street, east side, 71 feet south of south house line of Queen		3	6	14 ft. 10 in.	1	.....	.....	.....	.....	1	
Tenth street, east side 18 feet south of south house line of Mifflin		1	6	.....	1	.....	.....	1			
Thirteenth street, west side, 26 feet south of south house line of Snyder avenue		26	6	3 ft.	1	.....	.....	1			

Fire Hydrants Renewed—First District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.						
			6 in.	Removed.			Replaced by			
				Old.	No. 2.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Thirteenth street, west side, 153 feet south of south house line of Washington avenue	2	6	14 ft. 6 in.	1	.....	.....	.....	.....	1	
Twenty-second street, west side, 3 feet north of north house line of Oakford	26	12	3 ft. 6 in.	.....	1	.....	.....	.....	1	
Twenty-third street, southeast corner of Ellsworth	26	6	.....	.....	.....	1	.....	.....	.....	1
Tiernan street, east side, 154 feet south of south house line of Dickinson	26	6	5 ft.	1	.....	.....	.....	1		
Titan street, north side, 112 feet west of west house line of Twenty-first	26	6	.....	.....	1	.....	.....	.....	1	
Wheat street, west side, opposite centre of Keefe	2	4	5 ft.	1	.....	.....	.....	1		
Total	.....	.....	258 ft. 11 in.	43	2	1	17	15	13	1

Fire Hydrants Renewed—Continued.

SECOND DISTRICT.

Street. Location.	Ward.	Size of Main in Inches.	Connection.	Style.									
			6 in.	Removed.					Replaced by				
				Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Arch street, south side, 6 feet west of west house line of Chancery	6	8				1						1	
Baltimore avenue, north side, 81 feet east of east house line of Forty-third	27	6	22 ft. 10 in.	1							1		
Belmont avenue, east side, 53 feet south of south house line of Columbia avenue	24	12		1					1				
Benton street, west side, 2 feet north of north house line of Melloy	9	6	4 ft. 6 in.	1						1			
Black Horse alley, southwest corner of Front	6	6				1					1		
Bread street, east side, 155 feet south of south house line of New	6	6		1					1				
Broad street, east side, 6 feet north of north house line of Arch	10	20					1					1	
Broad street, west side, 8 feet north of north house line of Arch	10	20					1					1	
Cherry street, north side, 1 foot east of west house line of Hillsdale	6	6	10 ft. 4 in.	1						1			

Fire Hydrants Renewed—Second District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.									
				Removed.					Replaced by.				
			6 in.	Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Cherry street, north side, west house line of Eutaw	10	6	10 ft.	1						1			
Cherry street, north side, 186 feet east of east house line of Ninth	10	6	4 ft.	1						1			
Chestnut street, south side, 172 feet east of east house line of Thirteenth	8	10	4 ft 6 in.	1							1		
Chestnut street, northwest corner of Eighteenth	8	16						1				1	
Chestnut street, north side, east house line of Albion	9	16	4 ft.	1						1			
Chestnut street, north side, 10 feet west of west house line of Thirty-eighth	27	8	22 ft.	1							1		
Chestnut street, south side, 3 feet west of west house line of Forty-first	27	8		1					1				
Chestnut street, south side, 3 feet west of west house line of Forty-first	27	8	22 ft.	1						1			
Church street, north side, 131 feet west of west house line of Thirty-second	6	6		1					1				
Columbia avenue, south side, 293 feet east of east house line of Forty-second	24	6		1					1				

Fire Hydrants Renewed—Second District—*Continued.*

Street.	Location.	Ward.	Size of Main in Inches.	Connection.	Style.									
					Removed.					Replaced by				
				6 in.	Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Commerce street, north side, 187 feet west of west house line of Fifth		6	6						1			1		
Eighth street, west side, 119 feet south of south house line of Chestnut		8	10		1					1				
Eighth street, east side, south house line of Shoemaker		9	10	13 ft. 7 in.	1							1		
Eleventh street, west side, 100 feet north of north house line of Locust		8	10		1					1				
Elm avenue, south side, 17 feet west of west house line of Fortieth		24	10		1					1				
Elm avenue, south side, 17 feet west of west house line of Fortieth		24	10	11 ft.	1						1			
Elm avenue, south side, 25 feet west of west house line of Forty-second		24	10		1					1				
Elm avenue, south side, 271 feet east of east house line of Fifty-first		24	10		1					1				
Front street, southwest corner of Relief		5	8		1					1				
Fifth street, southwest corner of Race		6	10						1				1	

Fire Hydrants Renewed—Second District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.									
				Removed.					Replaced by				
			6 in.	Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Fifth street, west side, 115 feet north of north house line of Lombard	5	10		1				1					
Fortieth street, east side, 10 feet north of north house line of Ludlow	27	12	5 ft. 6 in.	1						1			
Fortieth street, east side, 23 feet south of south house line of Ogden	24	6	3 ft. 6 in.	1						1			
Forty-first street, east side, 8 feet north of north house line of Ludlow	27	6		1					1				
Forty-first street, east side, 49 feet north of north house line of Locust	27	6		1					1				
Forty-third street, east side, 119 feet south of south house line of Wallace	24	6	15 ft. 4 in.	1							1		
Forty-second street, east side, north house line of Chestnut	27	36						1			1		
Fifty-second street, west side, 94 feet north of north house line of Lancaster avenue	24	36						1				1	
Filbert street, south side, 11 feet 6 inches east of east house line of Juniper	9	6	15 ft. 6 in.	1							1		
Filbert street, north side, 157 feet west of west house line of Fifteenth	9	6		1						1			

Fire Hydrants Renewed—Second District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.									
				Removed.					Replaced by				
			6 in.	Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Girard avenue, south side, 334 feet west of west house line of Thirty-ninth	24	12	23 ft. 9 in.	1						1			
Girard avenue, south side, 240 feet east of east house line of Forty-first	24	12		1					1				
Hudson street, west side, 152 feet south of south house line of Market	6	6	6 ft.	1						1			
Jacoby street, west side, 89 feet 6 inches north of north house line of Winslow	10	6	9 ft. 9 in.	1						1			
Lancaster avenue, south side, 36 feet west of west house line of Thirty-fourth	24	8	36 ft. 6 in.	1							1		
Lancaster avenue, southwest corner of Spring Garden	24	12	25 ft. 2 in.	1							1		
Library street, north side, 183 feet west of west house line of Fourth	5	10	12 ft.	1							1		
Locust street, south side, west house line of Currant alley	8	6	4 ft.	1						1			
Lombard street, north side, 126 feet east of east house line of Eleventh	7	6		1					1				
Ludlow street, north side, 209 feet west of west house line of Forty-first	27	6	10 ft. 9 in.	1						1			

Fire Hydrants Renewed—Second District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.									
				Removed.					Replaced by.				
			6 in.	Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Market street, southeast corner of Letitia	6	6				1						1	
Market street, southwest corner of Fifth	6	6				1						1	
Market street, north side, 17 feet west of west house line of Thirteenth	9	6	8 ft.	1							1		
Market street, northeast corner of Thirty-seventh	24	10						1			1		
Market street, south side, 24 feet west of west house line of Forty-sixth	27	10		1					1				
Master street, south side, 176 feet east of east house line of Fiftieth	24	6		1					1				
Melrose street, south side, 243 feet west of west house line of Fifty-fourth	24	6		1					1				
Ninth street, east side, 96 feet north of north house line of Filbert	9	6	14 ft. 6 in.	1						1			
Nineteenth street, west side, 17 feet north of north house line of Wilcox	7	6		1					1				
Parrish street, south side, 27 feet west of west house line of Union	24	6		1					1				

Fire Hydrants Renewed—Second District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.									
				6 inch.	Removed.					Replaced by				
					Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Pine street, south side, 17 feet west of west house line of Delaware avenue		5	6				1						1	
Pine street, north side, 195 feet east of east house line of Seventeenth		7	6	16 ft. 6 in.										
Pine street, south side, 370 feet west of west house line of Thirty-fourth		27	6		1					1				
Race street, southeast corner of Eighth		10	6						1					1
Race street, south side. 184 feet east of east house line of Broad		10	8	14 ft.	1							1		
Rittenhouse, south side, 209 feet east of east house line of Twentieth		8	6	4 ft. 6 in.	1						1			
Rockland street, north side, 34 feet 6 inches west of west house line of Thirty-sixth		24	6		1					1				
Sansom street, south side, 182 feet east of east house line of Nineteenth		8	6		1					1				
Second street, west side of market shed, 18 feet south of south house line of Pine		5	6		1					1				
Sixteenth street, south house line of Stowe		7	6		1					1				

Fire Hydrants Renewed—Second District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.									
				6 inch.	Removed.					Replaced by				
					Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Seventeenth street, west side, 141 feet north of north house line of Arch		10	6	14 ft.	1						1			
Spruce street, southeast corner of Front		5	6				1						1	
Spring Garden street, north side, 8 feet west of west house line of Bell		24	6		1					1				
St. Mary street, south side, 63 feet east of east house line of Seventh		5	3	5 ft. 6 in.	1						1			
Third street, west side south house line of Cherry		6	6		1					1				
Tenth street, west side, 96 feet south of south house line of Race		10	6	14 ft.	1						1			
Twelfth street, east side, 8 feet north of north house line of Clover		9	6			1							1	
Thirteenth street, east side, 123 feet south of south house line of Market street		9	6		1					1				
Thirteenth street, west side, opposite centre of Monterey		10	6	16 ft.	1							1		
Twenty-second street, west side, 151 feet south of south house line of Race		10	6	18 ft.	1							1		
Twenty-fifth street, southeast corner of Ashburton		7	6		1					1				

Fire Hydrants Renewed—Second District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.									
					Removed.					Replaced by				
				6 in.	Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Thirty-fourth street, northeast corner of Hamilton		24	6	3 ft. 3 in.	1								1	
Thirty-fifth street, west side, 144 feet north of north house line of Fairmount avenue		24	6		1					1				
Thirty-ninth street, west side, 25 feet north of north house line of Filbert		24	6		1					1				
Thirty-ninth street, east side, 283 feet north of north house line of Filbert		24	6	15 ft.	1							1		
Thirty-ninth street, east side, 283 feet north of north house line of Filbert		24	6			1						1		
Thompson street, south side, 179 feet west of west house line of Fiftieth		24	6		1					1				
Tower street, north side, 248 feet west of west house line of Twentieth		10	4		1					1				
Vine street, northeast corner of Eighth		13	12				1						1	
Vine street, south side, east house line of Fisher's avenue		24	6		1					1				
Vine street, south side, 12 feet 6 inches east of east house line of Fifty-seventh		24	6	9 ft. 6 in.	1						1			

Fire Hydrants Renewed—Second District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.									
					Removed.					Replaced by				
				6 in.	Old.	No. 2.	No. 3.	No. 4.	No. 5.	Old.	New, No. 1.	New, No. 2.	New, No. 3.	New, No. 5.
Vine street,	south side, 54 feet 6 inches east of east house line of Sixty-fourth	24	6		1					1				
Walnut street,	southeast corner of Second	5	12						1				1	
Walnut street,	south side, opposite centre of Seventh	5	12						1				1	
Walnut street,	south side, 3 feet west of west house line of Eleventh	8	12						1			1		
Walnut street,	north side, 10 feet east of east house line of Cope	8	6		1					1				
Wallace street,	south side, 56 feet west of west house line of Thirty-third	24	6		1					1				
Water street,	west side, 149 feet north of north house line of Chestnut	6	6		1					1				
Westminster avenue,	north side, 30 feet west of west house line of Fifty-fourth	24	12	13 ft. 8 in.	1							1		
Wetherill street,	east side, 145 feet south of south house line of Pine	7	3		1				1					
Totals				462 ft. 11 in.	77	2	7	2	10	40	20	22	15	1

Fire Hydrants Renewed—Continued.

Third District.

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.				
				6 in.	Removed.		Replaced by		
					Old.	New, No. 3.	Old.	New, No. 1.	New, No. 2.
Adams street. northeast side, 109 feet southeast of southeast house line of Cedar		31	6		1			1	
Adams street, northeast side, 322 feet northwest of northwest house line of Kensington ave		23	6	8 ft. 4 in.	1			1	
Allegheny avenue, southwest side, 78 feet southeast of southeast house line of Kensington ave		25	6		1		1		
Beach street, east side, 145 feet 6 inches south of south house line of Otis		18	6	4 ft.	1			1	
Boudinot street, northeast side, 9 feet southeast of southeast house line of Hart lane		25	6		1		1		
Church street, southwest side, 65 feet 6 inches northeast of northeast house line of Franklin		23	6	13 ft.	1				1
Church street, south side, 4 feet west of west house line of Kirkbride		25	6	4 ft.	1			1	
Crease street, east side, 122 feet 6 inches south of south house line of Wildey		18	6	9 ft.	1			1	
Delaware avenue, west side, 135 feet north of north house line of Willow		12	6		1		1		
Diamond street, north side, 225 feet east of east house line of Hancock		19	6	10 ft.	1				1
Emlen street, northeast side, 149 feet northwest of northwest house line of Almond		31	6		1		1		
Emlen street, southwest side, 170 feet southeast of southeast house line of Cedar		31	6	5 ft.	1			1	
Fairhill street, west side, 75 feet south of south house line of York		19	4	4 ft. 6 in.	1			1	

Fire Hydrants Renewed—Third District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.				
					Removed.		Replaced by		
				6 in.	Old.	New, No. 3.	Old.	New, No. 1.	New, No. 2.
Fillmore street, east side, 41 feet south of south house line of Huntingdon		25	6	.....	1	.....	1		
Frankford avenue northwest side .8 feet southeast of southeast house line of Norris		19	10	12 ft.	1	.....	.....	.....	1
Frankford avenue, east side, 281 feet south of south house line of Lehigh avenue		31	10	5 ft. 2 in.	1	.....	.....	1	
Frankford avenue, east side, south house line of Sellers		23	4	10 ft. 3 in.	1	.....	.....	.....	1
Frankford avenue, northwest side, 163 feet northeast of northeast house line of Sellers		23	12	10 ft.	1	.....	.....	.....	1
Franklin street, southeast side, 160 feet northeast of northeast house line of Sellers		23	6	14 ft. 7 in.	1	.....	.....	1	
Franklin street, southeast side, 32 feet northeast of northeast house line of Oxford pike		23	6	.....	1	.....	1		
George street, south side, 7 feet 4 inches west of west house line of Lawrence		16	6	9 ft. 10 in.	1	.....	.....	.....	1
Howard street, west side, 165 feet north of north house line of Davis		19	6	7 ft.	1	.....	.....	1	
Howard street, west side, 177 feet 6 inches north of north house line of Montgomery		19	6	14 ft.	1	.....	.....	1	
Kensington avenue, southeast side, 414 ft. 6 in. northeast of northeast house line of Lehigh av.		25	6	.....	1	.....	1		
Kensington avenue, southeast side, 258 feet northeast of Philadelphia and Reading Railroad		25	6	.....	1	.....	1		
Kensington avenue northwest side, 31 feet southwest of southwest house line of "K"		25	4	.....	1	.....	1		
Kensington avenue, northwest side, 170 feet northeast of northeast house line of Allegheny av.		25	6	.....	1	.....	1		

Fire Hydrants Renewed—Third District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches	Connection.	Style.				
				6 in.	Removed.		Replaced by		
					Old.	No. 3.	Old.	No. 1.	No. 2.
Kensington avenue, southeast side, 90 feet north of northeast house line of Meighan		25	6		1		1		
Kirkbride, north side, 63 feet west of west house line of Salmon		25	6	2 ft. 7 in.	1			1	
Laurel street, north side, 223 feet east of east house line of Front		16	10	15 ft. 10 in.	1			1	
Marlborough street, southwest side, 283 feet southeast of southeast house line of Belgrade		18	6		1			1	
Orthodox street, northeast side, 102 feet southeast of southeast house line of Pierce		23	6		1		1		
Orthodox street, southwest side, 66 feet 6 inches southeast of southeast house line of Hedge		23	6	14 ft. 5 in.	1				1
Oxford street, south side, 2 feet west of west house line of Howard		17	10	8 ft.	1				1
Paul street, west side, 392 feet north of north house line of Orthodox		23	6		1			1	
Second street, west side, 78 feet north of north house line of Green		11	6	18 ft. 3 in.	1			1	
Second street, east side, 97 feet south of south house line of Susquehanna avenue		19	6	26 ft.	1			1	
Second street, west side, 291 feet north of north house line of Susquehanna avenue		19	6	18 ft. 6 in.	1			1	
Seventh street, east side, 134 feet south of south house line of Huntingdon		19	6	5 ft. 6 in.	1			1	
Shackamaxon street, southwest side, 148 feet 2 inches northwest of northwest house line of Girard avenue		18	6	17 ft. 3 in.	1			1	
Slossman street, south side, east house line of Third		16	4	4 ft. 4 in.	1				1

Fire Hydrants Renewed—Third District—*Continued.*

Street.	Location.	Ward.	Size of Main in Inches.	Connection.	Style.				
				6 in.	Removed.		Replaced by		
					Old.	New, No. 3.	Old.	New, No. 1.	New, No. 2.
Summer street, west side, 55 feet south of south house line of Fremont		25	6	7 ft. 10 in.	1	.....	.....	1	
Susquehanna avenue, north side, 22 feet east of east house line of Siloam		18	6	14 ft. 10 in.	1	.....	.....	.....	1
Tacony street, southeast side, 32 feet northeast of northeast house line of Paul		23	6	.....	1	.....	1		
Third street, west side, 93 feet south of south house line of Willow		11	10	2 ft. 10 in.	1	.....	.....	.....	1
Thompson street, southeast side, opposite centre of Earl		18	6	.....	.....	1	1		
Thompson street, east side, 26 feet north of north house line of Geisler		18	6	.....	1	.....	1		
Thouron street, west side, 153 feet north of north house line of Diamond		19	4	.....	1	.....	1		
Wreckin street, southwest side, 160 feet northwest of northwest house line of Cedar		31	6	.....	1	.....	....	1	
Wyoming street, northeast side, 352 feet southwest of southwest house line of Clearfield		25	6	11 ft. 8 in.	1	.....	.....	1	
York street, southwest side, 4 feet southeast of southeast house line of Cedar	....	31	4	.....	1	.....	1		
York street, southwest side, southeast house line of Sepviva		31	4	9 ft. 3 in.	1	.....	.....	.....	1
Totals		.....	.....	317 ft. 9 in.	51	1	17	23	12

Fire Hydrants Renewed—Continued.

Fourth District.

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.						
				6 in.	Removed.			Replaced by			
					Old.	No. 2.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Brandywine street, south side, 204 feet east of east house line of Seventeenth		15	4	10 ft. 4 in.	1	.....	.....	.....	1		
Broad street, east side, 213 feet north of north house line of Dauphin		28	6	.....	1	.....	.....	1			
Buttonwood street, 83 feet east of east house line of Eighteenth		15	6	12 ft.	1	.....	.....	.....	.....	1	
Callowhill street, north side, 126 feet north of north house line of Biddle		15	6	.....	1	.....	.....	1			
Callowhill street, south side, 115 feet west of east house line of Twenty-sixth		15	6	15 ft. 7 in.	1	.....	.....	.....	.....	1	
Diamond street, 140 feet west of west house line of Ninth, in Bureau of Gas yard		20	6	.....	1	.....	.....	1			
Fifteenth street, west side, 2 feet south of south house line of Eliza		29	6	.....	1	.....	.....	1			
Fletcher street, north side, 27 feet east of east house line of Twenty-seventh		28	6	.....	1	.....	.....	1			
Girard avenue, north side, 384 feet west of Philadelphia & Reading R. R. bridge		29	10	37 ft.	1	.....	.....	.....	1		
Hamilton street, north side, 76 feet 8 inches east of east house line of Eighteenth		15	6	15 ft. 8 in.	1	.....	.....	.....	1		
Jefferson street, south side, 30 feet east of east house line of Stillman		29	6	.....	1	.....	.....	1			
Jefferson street, south side, 109 feet east of east house line of Twenty-seventh		29	6	.....	1	.....	.....	1			
Jefferson street, north side, 65 feet east of east house line of Twenty-eighth		29	6	.....	1	.....	.....	1			

Fire Hydrants Renewed—Fourth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.						
				6 in.	Removed.			Replaced by			
					Old.	No. 2.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Master street, north side, 17 feet west of west house line of Warnock		20	6				1		1		
Master street, south side, 1 foot 6 inches west of east house line of Twelfth		20	6	15 ft. 6 in.	1					1	
Parrish street, north side, opposite the center of Twenty-first		15	8	3 ft. 6 in.	1				1		
Pennsylvania avenue, south side, 200 feet east of east house line of Nineteenth		15	4	8 ft.	1				1		
Spring Garden Station, 37 feet 10 inches northeast of boiler room of new engine house		29	36			1			1		
Stiles street, north side, 2 feet east of east house line of Hollywood		29	6		1			1			
Thompson street, north side, 16 feet east of east house line of Ninth		20	4	7 ft. 10 in.	1				1		
Twentieth street, east side, 12 feet south of south house line of Fairmount ave		15	6	3 ft. 6 in.	1				1		
Twenty-third street, west side, 5 feet 6 inches south of north house line of Gold		15	6				1				1
Twenty-seventh street, east side, 22 feet south of south house line of Church		29	6		1			1			
Uber street, east side, 1 foot south of south house line of Berks		28	6				1			1	
Warnock street, east side, 14 feet north of north house line of Cumberland		28	6		1			1			
Wood street, south side, 82 feet west of west house line of Franklin		13	4	16 ft.	1				1		
York street, south side, 85 feet west of west house line of Sixteenth		28	6		1			1			
York street, south side, 161 feet east of east house line of Twenty-second		28	6				1				1
Totals				144 ft. 11 in.	23	1	4	12	10	4	2

Fire Hydrants Renewed—Continued.

FIFTH DISTRICT.

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.					
					Removed.			Replaced by		
				6 inch.	Old.	No. 1.	No. 2.	Old.	New, No. 2.	New, No. 3.
Baker street, northeast side, 169 feet southeast of southeast house line of Center		21	6	9 ft.	1	.....	.....	.....	1	
Center street, northwest side, 37 feet northeast of northeast house line of Wabash		21	6	.....	1	.....	.....	1		
Center street, northwest side, 37 feet northeast of northeast house line of Wabash		21	6	9 ft.	1	.....	.....	.....	1	
Center street, northwest side, 70 feet southwest of southwest house line of Wood		21	6	8 ft. 6 in.	1	.....	.....	.....	1	
Cotton street, northwest side, 156 feet 6 inches southwest of southwest house line of Wood		21	6	.....	.....	1	.....	.....	1	
Cotton street, northwest side, 69 feet northeast of northeast house line of Main		21	6	.....	1	.....	.....	.....	1	
Cotton street, northwest side, 69 feet northeast of northeast house line of Main		21	6	3 ft.	.....	.....	1	.....	.....	1
Green lane, southeast side, 43 feet northeast of northeast house line of Cresson		21	6	.....	1	.....	.....	1		
Jefferson street, southeast side, 78 feet southwest of southwest house line of Smick		21	6	.....	1	.....	.....	1		
Leverington avenue, northwest side, 8 feet southwest of southwest house line of Hamilton street		21	6	1 ft. 6 in.	1	.....	.....	1		
Lyceum avenue, southeast side, 231 feet southwest of southwest house line of Mitchell		21	6	12 ft.	1	.....	.....	.....	1	
Ridge avenue, southwest side, 305 feet northwest of northwest house line of Bridge		28	6	4 ft.	1	.....	.....	.....	.....	1

Fire Hydrants Renewed—Fifth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.					
				6 inch.	Removed.			Replaced by		
					Old.	No. 1.	No. 2.	Old.	New, No. 2.	New, No. 3.
Ridge avenue, northeast side, 77 feet northwest of northwest house line of Sumac		21	6	.....	1	.....	.....	1	.....	
Ridge avenue, northeast side, 77 feet northwest of northwest house line of Sumac		21	6	5 ft.	1	.....	.....	.....	1	
Ridge avenue, southeast side, 53 feet northwest of northwest house line of Bolton ave		21	6	.....	1	.....	.....	1		
River road, northeast side, 368 feet southeast of southeast house line of Fountain		21	6	4 ft. 6 in.	1	.....	.....	.....	1	
River road, northeast side, 368 feet southeast of southeast house line of Fountain		21	6	.....	.....	.....	1	.....	1	
Sumac street, southeast side, 22 feet southwest of southwest house line of Manayunk ave		21	6	14 ft. 6 in.	1	.....	.....	.....	1	
Washington street, southwest side, 59 feet northwest of northwest house line of Hermitage		21	6	....	1	.....	.....	1		
Totals		.....	.....	71 ft.	15	2	2	7	10	2

Fire Hydrants Renewed—Continued.

Sixth District.

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.						
				6 in.	Removed.			Replaced by.			
					Old.	New, No. 1.	New, No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Bethlehem pike, south side, 7 feet 7 inches northeast of northeast house line of Summit		22	6	7 ft. 6 in.	1	.....	.....	1			
Bethlehem pike, northwest side, 409 feet 3 inches northeast of northeast house line of Summit		22	6	29 ft. 2 in.	.....	1	.....	.....	1		
Broad street, west side, southwest corner of Westmoreland		28	6	.....	1	.....	.....	1			
Broad street, east side, 209 feet 8 inches south of centre of Ontario		28	6	.....	.....	.....	1	.....	.....	.....	1
Cayuga street, north side, 108 feet 3 inches east of east house line of Fifteenth		25	6	17 ft. 7 in.	1	.....	.....	.....	1		
Cayuga street, southwest corner of Seventeenth		28	6	.....	1	.....	.....	1			
Center street, southeast side, 344 feet 4 inches southwest of southwest house line of Morton		22	6	10 ft. 11 in.	1	.....	.....	.....	1		
Center street, northwest side, 109 feet 9 inches southwest of southwest house line of Wilson		22	6	11 ft. 5 in.	1	.....	.....	.....	.....	1	
Center street, northwest side, 258 feet 9 inches northeast of northeast house line of Hancock		22	6	9 ft. 10 in.	1	.....	.....	.....	1		
Chelton avenue, southeast side, 26 feet 10 inches northeast of northeast house line of Willow avenue		22	6	3 ft.	.....	.....	1	.....	.....	1	

Fire Hydrants Renewed—Sixth District—*Continued.*

Street.	Location.	Ward.	Size of Main in Inches.	Connection.	Style.					
				6 in.	Removed.			Replaced by.		
					Old.	No. 1.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Chelton avenue, southeast side, 399 feet 3 inches northeast of northeast house line of Hancock		22	6	26 ft. 5 in.	1	.....	.....	.....	.....	1	
Chelten avenue, northwest side, 11 feet northeast of northeast house line of Hancock		22	6	25 ft. 9 in.	1	.....	.....	.....	.....	1	
Chelten avenue, northwest side, 285 feet 10 inches northeast of northeast house line of Germantown avenue		22	6	22 ft. 8 in.	1	.....	.....	.....	1		
Clivedon street, southeast side, 331 feet northeast of northeast house line of Germantown avenue		22	6	4 ft. 10 in.	1	.....	.....	.....	.....	1	
Cumberland street, southwest side, 45 feet 3 inches northwest of northwest house line of Mill		22	6	13 ft.	1	.....	.....	.....	1		
Cumberland street, northeast side, 200 feet southeast of southeast house line of Armat		22	6	23 ft. 8 in.	1	.....	.....	.....	1		
Garfield street, southeast side, 89 feet southwest of southwest house line of Wakefield		22	6	1 ft. 9 in.	1	.....	.....	.....	1		
Germantown avenue, southwest side, 103 feet 6 inches southeast of southeast house line of Queen		22	10	11 ft. 8 in.	1	.....	.....	.....	.....	1	
Germantown avenue, northeast side, 94 feet 6 inches northwest of northwest house line of Meehan		22	10	5 ft. 2 in.	1	.....	.....	.....	.....	1	

Fire Hydrants Renewed—Sixth District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.						
			6 in.	Removed.			Replaced by.			
				Old.	No. 1.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Germantown avenue, southwest side, 311 feet feet 10 inches northeast of northeast house line of Musgrove	22	6	.....	1	.....	.....	1			
Hancock street, northeast side, 184 feet northwest of northwest house line of Haines	22	6	.....	1	.....	.....	1			
Juniata street, northwest corner of Seventeenth	28	6	.....	1	.....	.....	1			
Juniata street, northwest side, 357 feet southwest of southwest house line of Germantown avenue	28	6	14 ft. 4 in.	1	.....	.....	.....	1		
Manheim street, northwest side, 580 feet southwest of southwest house line of Morris	22	6	.....	1	.....	.....	1			
Marion street, northeast side, opposite centre of Lehman	22	6	11 ft.	1	.....	.....	.....	.....	1	
Mather street, southwest corner of Venango	28	6	.....	.....	.....	1				1
Mechlin street, southeast side, 63 feet 5 inches southwest of southwest house line of Wakefield	22	6	4 ft.	1	.....	.....	.....	1		
Morris street, northeast side, 143 feet 10 inches southeast of southeast house line of Bixley	22	6	2 ft.	1	.....	.....	.....	1		
Pastorious street, northwest side, 314 feet 7 inches northeast of northeast house line of Germantown avenue	22	6	17 ft. 10 in.	1	.....	.....	.....	1		

Fire Hydrants Renewed—Sixth District—*Continued.*

Street. Location.	Ward.	Size of Main in inches.	Connection.	Style.						
			6 in.	Removed.			Replaced by			
				Old.	No. 1.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Penn street, northwest side, 486 feet 9 inches southwest of southwest house line of Chew	22	6	22 ft. 4 in.	1	.....	.....	.....	1		
Penn street, southeast side, 873 feet 10 inches southwest of southwest house line of Chew	22	6	11 ft. 8 in.	1	.....	.....	.....	.....	1	
Penn street, northwest side, 248 feet 10 inches northeast of northeast house line of Ross	22	6	20 ft. 10 in.	1	.....	.....	.....	1		
Penn street, southeast side, 73 feet 10 inches southwest of southwest house line of Ross	22	6	18 ft. 1 in.	1	.....	.....	.....	1		
Penn street, northwest side, 247 feet 3 inches northeast of northeast house line of Peale	22	6	24 ft.	1	.....	.....	.....	1		
Penn street, southeast side, 205 feet northeast of northeast house line of Wayne	22	4	.....	1	.....	.....	1			
Queen lane, southeast side, 199 feet feet 6 inches southwest of southwest house line of Laurens	22	6	17 ft. 3 in.	1	.....	.....	.....	1		
Rubicam street, northeast side, 201 feet southeast of southeast house line of Wister	22	6	22 ft. 8 in.	1	.....	.....	.....	1		
School lane, southeast side, 414 feet northeast of northeast house line of Township line	22	4	2 ft. 6 in.	1	.....	.....	.....	1		
Sharpnack street, northwest side, 15 feet 3 inches northeast of northeast house line of Nash	22	8	15 ft. 6 in.	1	.....	.....	.....	1		

Fire Hydrants Renewed—Sixth District—*Continued.*

Street.	Location.	Ward.	Size of Main in inches.	Connection.	Style.						
				6 in.	Removed.			Replaced by.			
					Old.	No. 1.	No. 3.	Old.	New, No. 1.	New, No. 2.	New, No. 3.
Sharpnack street, southeast side, 37 feet 6 inches northeast of northeast house line of Nash		22	8	11 ft. 7 in.	1	.....	.....	.....	1		
Sharpnack street, northwest side, 326 feet 5 inches northeast of northeast house line of Musgrove		22	8	11 ft. 11 in.	1	.....	.....	.....	1		
Sharpnack street, southeast side, 329 feet northeast of northeast house line of Germantown avenue		22	8	13 ft. 3 in.	1	.....	.....	.....	1		
Wakefield street, northeast side, opposite centre of Mehl		22	6	11 ft. 1 in.	1	.....	.....	.....	.....	1	
Wakefield street, southwest side, opposite centre of Wisteria		22	6	15 ft. 2 in.	1	.....	.....	.....	.....	1	
Washington lane, southeast side, 389 feet northeast of northeast house line of Hancock		22	6	.....	1	.....	.....	1	.....	.....	.....
Wistar street, southeast side, 123 feet northeast of northeast property line of Philadelphia and Reading Railroad		22	6	18 ft. 9 in.	1	.....	.....	.....	1	.....	.....
Total		.....	.....	510 ft. 1 in.	42	1	3	9	24	11	2

Recapitulation of Fire Hydrants Set, Renewed, and Removed.

	Districts.	Style.					Total.
		Old.	No. 1, 1-way.	No. 2, 2-way,	No. 3, 3-way,	No. 5, 3-way.	
Set.	First	.....	16	21	67	.....	104
	Second	1	14	24	31	.....	70
	Third	10	22	28	86	.....	146
	Fourth	.....	21	47	92	.....	160
	Fifth	.....	4	10	2	.....	16
	Sixth	10	23	15	36	.....	84
	Totals	21	100	145	314	.....	580
Renewed.	First	17	15	13	1	.....	46
	Second	40	20	22	15	1	98
	Third	17	23	12	.....	.....	52
	Fourth	12	10	4	2	.....	28
	Fifth	7	.....	10	2	.....	19
	Sixth	10	23	11	2	.....	46
	Totals	103	91	72	22	1	289
	Total New Hydrants	124	191	217	385	1	869
Removed.	First	91	.....	.....	3	.....	94
	Second	55	.....	1	.....	.....	56
	Third	96	2	.....	3	.....	101
	Fourth	101	.....	.....	.....	.....	101
	Fifth	5	.....	.....	.....	.....	5
	Sixth	9	.....	.....	.....	.....	9
	Totals	357	2	1	6	.....	366
	Total added during 1888	.....	.....	.....	.....	.....	214

FIRE HYDRANTS, BY PURVEYORS' DISTRICTS,

And the diameter of the pipes to which they are connected.

Purveyors' Districts.	Size of Pipes in Inches.												Total.
	3	4	6	8	10	12	16	18	20	30	36	48	
First	50	232	904	30	35	18	10	.....	13	1	7	.....	1,300
Second	56	66	1,019	153	141	167	29	.....	24	19	3	8	1,685
Third	1	224	1,136	7	145	39	2	4	26	14	7	.....	1,605
Fourth	1	135	981	6	94	43	13	.....	11	15	3	9	1,311
Fifth	.....	20	265	.....	10	6	3	.....	5	.....	.....	.....	309
Sixth	32	63	520	15	43	27	17	.....	2	.....	.....	.....	719
Totals	140	740	4,825	211	468	300	74	4	81	49	20	17	6,929

FIRE HYDRANTS BY WARDS,

And the Diameter of the Pipes to which they are connected.

Wards.	Size of Pipes in Inches.												Total.
	3	4	6	8	10	12	16	18	20	30	36	48	
First	5	98	225	3	.....	.....	4	.....	.....	.....	.....	.....	335
Second	23	34	115	11	5	1	2	.....	1	.....	.....	.....	192
Third	9	6	71	9	14	.....	.....	.....	.....	.....	.....	.....	109
Fourth	9	6	67	3	11	.....	1	.....	.....	1	.....	.....	98
Fifth	4	9	66	36	31	9	1	.....	.....	.....	.....	.....	156
Sixth	1	.....	102	9	11	.....	1	.....	1	7	.....	.....	132
Seventh	11	5	106	.....	8	17	14	.....	2	.....	.....	3	166
Eighth	11	2	95	.....	12	30	8	.....	2	.....	.....	2	162
Ninth	4	3	94	.....	17	11	5	.....	4	5	.....	2	145
Tenth	11	8	85	2	13	11	.....	.....	10	2	.....	1	143
Eleventh	.....	14	45	1	18	.....	.....	.....	.....	.....	.....	.....	78
Twelfth	.....	13	42	.....	26	1	2	.....	.....	.....	.....	.....	84
Thirteenth	.....	18	75	.....	15	6	.....	.....	.....	.....	.....	.....	114
Fourteenth	.....	11	82	.....	22	5	1	.....	3	2	.....	.....	126
Fifteenth	1	39	195	2	26	5	3	.....	5	4	.....	9	289
Sixteenth	.....	15	42	.....	25	5	.....	.....	2	.....	.....	.....	89
Seventeenth	1	20	61	.....	8	2	.....	.....	2	.....	.....	.....	94
Eighteenth	.....	37	86	.....	26	.....	.....	.....	17	.....	.....	.....	166
Nineteenth	.....	60	223	.....	9	.....	.....	4	.....	.....	2	.....	298
Twentieth	.....	45	160	.....	5	16	.....	.....	.....	2	.....	.....	228
Twenty-first	.....	21	226	.....	10	3	3	.....	5	.....	.....	.....	268
Twenty-second	32	63	406	15	41	18	17	.....	2	.....	.....	.....	594
Twenty-third	.....	3	131	.....	.....	2	.....	.....	5	.....	.....	.....	141
Twenty-fourth	14	22	331	24	26	51	.....	.....	5	5	.....	.....	478
Twenty-fifth	.....	19	391	6	26	18	.....	.....	.....	10	5	.....	475
Twenty-sixth	3	57	287	4	3	12	2	.....	8	.....	.....	.....	376
Twenty-seventh	.....	15	140	82	21	33	.....	.....	.....	.....	3	.....	294
Twenty-eighth	.....	1	391	2	2	26	.....	.....	3	3	.....	.....	428
Twenty-ninth	.....	20	192	2	24	2	9	.....	.....	4	3	.....	256
Thirtieth	1	34	139	.....	2	5	1	.....	4	.....	7	.....	193
Thirty-first	.....	42	154	.....	11	11	.....	.....	.....	4	.....	.....	222
Totals	140	740	4,825	211	468	300	74	4	81	49	20	17	6,929

STATEMENT OF THE NUMBER OF FIRE HYDRANTS, BY DISTRICTS AND WARDS.

During 1888, and total previous thereto.

	First District.							Second District.								Third District.										Fourth District.							Fifth District.			Sixth District.				Total.
	Wards.						Total.	Wards.							Total.	Wards.									Total.	Wards.						Total.	Wards.		Total.	Wards.			Total.	
	1	2	3	4	26	30		5	6	7	8	9	10	24	27		11	12	16	17	18	19	23	25	31		13	14	15	20	28	29		21	28		22	25	28		
Prior to 1888	....	...	...	...	...	...	1,290	...	...	...	...	...	...	...	...	1,671	...	...	...	...	...	...	...	...	1,560	...	...	...	...	...	...	1,252	.	....	298	.....	.....	.....	644	6,715
During 1888	21	20	6	8	36	13	104	5	...	5	3	14	10	18	15	70	1	8	6	6	12	34	26	44	9	146	5	23	40	5	54	33	160	15	1	16	67	3	14	84	580
Total	....	...	...	...	...	...	1,394	...	...	...	...	...	...	...	...	1,741	...	...	...	...	...	...	...	...	1,706	...	...	...	...	...	...	1,412	.....	.....	314	.....	.....	.....	728	7,295
Taken out in 1888	....	...	...	...	...	...	94	...	.	...	...	...	...	...	...	56	...	...	...	...	...	...	...	...	101	...	...	..	...	...	..	101	.....	.....	5	.....	.....	.....	9	366
Total in city	....	...	...	...	...	...	1,300	..	...	...	...	...	...	..	...	1,685	...	...	...	...	...	...	...	...	1,605	...	...	...	...	...	...	1,311	.....	.....	309	.....	.....	.....	719	6,929

Number of attachments for fire purposes previously reported..... 340

Made during 1888:
- First District..... 3
- Second District..... 7
- Third District..... 9
- Fourth District..... 2
- Fifth District..... 3
- Sixth District..... 4

Total..... 368

ATTACHMENTS, ETC., MADE BY THE PURVEYORS,

In accordance with permits issued by the Receiver of Taxes.—Arranged by Months.

Months.	New Attachments.							Shut off by permit.							Work done without permit.				
	Size.											Repairs.			Drawn.				
	½ inch.	⅝ inch.	¾ inch.	1 inch.	1½ inch.	2 inch.	Total.	Reamed for larger attachment.	Re-drive.	Discontinued.	Transfer.	Not drawn.	Drawn and re-driven.	Total.	Discontinued and abandoned.	Delinquent.	Leak.	Total.	Drawn and re-driven.
January	105	5	2	2	.....	2	116	1	12	5	.....	8	13	39	4	10	8	22	4
February	43	1	3	2	.....	1	50	.....	5	2	.....	10	17	34	3	.....	19	22	
March	219	5	6	3	.....	1	234	1	13	2	1	4	36	57	4	.....	15	19	2
April	687	21	9	9	.....	2	728	14	28	13	5	12	86	158	5	.....	15	20	24
May	751	18	16	17	3	1	806	15	14	18	5	12	73	137	5	.....	20	25	15
June	648	26	16	14	2	8	714	21	17	13	6	7	72	136	9	.....	16	25	15
July	972	21	15	19	1	.....	1,028	18	24	14	4	9	49	118	6	3	28	37	4
August	914	37	12	18	2	4	987	11	30	15	6	6	56	124	7	.....	22	29	182
September	951	17	18	5	4	4	999	9	26	17	4	9	49	114	7	.....	14	21	79
October	1,070	17	18	10	3	12	1,130	13	7	15	6	6	46	93	12	2	9	23	73
November	1,430	22	15	14	7	15	1,503	13	15	41	6	3	36	114	21	4	15	40	88
December	470	3	9	5	1	5	493	17	15	9	1	2	27	71	3	1	26	30	1
Totals	8,260	193	139	118	23	55	8,788	133	206	164	44	88	560	1,195	86	20	207	313	487

ATTACHMENTS, ETC., MADE BY THE PURVEYORS,

In accordance with permits issued by the Receiver of Taxes.

Arranged by Districts.

Districts.	New Attachment.							Shut off by Permit.							Work Done Without Permit.					
	Size.											Repairs.			Drawn.					
	½ inch.	⅝ inch.	¾ inch.	1 inch.	1½ inch.	2 inch.	Total.	Reamed for larger attachment.	Re-drive.	Discontinued.	Transfer.	Not Drawn.	Drawn and Re-driven.	Total.	Discontinued and abandoned.	Duplicate.	Delinquent.	Leak.	Total.	Drawn and Re-driven.
First	1,441	26	18	14	.....	3	1,502	15	23	16	2	.....	71	127	.....	.....	2	31	33	213
Second	1,120	43	36	41	12	23	1,275	54	72	97	11	.....	122	356	19	.....	3	60	82	242
Third	1,684	36	29	30	5	14	1,798	.....	32	1	5	63	130	231	56	.....	2	48	106	
Fourth	2,885	55	26	16	4	8	2,994	58	58	35	10	15	203	379	10	.....	13	58	91	3
Fifth	349	5	10	2	.....	.....	366	1	4	3	9	10	5	32	.....	.....	.....	6	6	14
Sixth	781	28	20	15	2	7	853	5	17	12	7	.....	29	70	1	.....	.....	4	5	15
Totals	8,260	193	139	118	23	55	8,788	133	206	164	44	88	560	1,195	86	.....	20	207	323	487

Account of New Stops for 1888.

Districts.	Water Department.		Viney.				Total.
	2-Way.	Butterfly.	2-Way.	3-Way.	4-Way.	5-Way.	
First	107	.....	7	7	4	3	128
Second	72	.....	.....	14	5	2	93
Third	148	1	....	8	3	3	163
Fourth	173	3	2	35	11	13	237
Fifth	55	.....	.....	.....	.....	.....	55
Sixth	94	.....	2	.....	.....	.....	96
Totals	647	4	11	64	23	21	772

Repairs to Main Stops and Fire Hydrants; also, Stops and Fire Hydrants removed during 1888.

Districts.	Repairs to Mains.	Stops.			Fire Hydrants.		
		Repaired.	Renewed.	Removed.	Repaired.	Renewed.	Removed.
First	73	610	41	.....	483	46	94
Second	100	514	29	3	431	98	56
Third	388	924	10	7	1,681	52	101
Fourth	233	349	6	6	1,014	28	101
Fifth	12	87	1	2	90	19	5
Sixth	83	23	6	2	89	46	9
Totals	889	2,507	93	20	3,788	289	366

Number of Complaints and Examined during 1887 and 1888.

Months.	Hydrants.		Service Pipe.		Wash Pave.		Spigots.		Water Closets.		Horse Troughs.		No Leak.		Total.	
	1887.	1888.	1887.	1888.	1887.	1888.	1887.	1888.	1887.	1888.	1887.	1888.	1887.	1888.	1887.	1888.
January	407	392	107	177	36	79	1	1	.....	1	7	5	67	76	625	731
February	205	301	67	194	23	66	.....	.....	.....	1	1	4	24	126	320	692
March	186	190	108	192	14	19	.....	4	....	1	.....	.....	53	86	361	442
April	168	114	80	99	21	12	.....	.....	....	.....	3	.....	21	26	293	251
May	187	117	79	61	11	7	5	1	.....	.....	.....	.....	47	17	329	203
June	248	125	73	74	14	8	1	1	.....	1	.....	.....	56	41	392	250
July	218	133	65	54	17	4	1	.....	.....	2	.....	.....	93	35	394	228
August	311	112	63	49	9	8	1	4	....	3	1	2	54	35	439	213
September	201	116	92	83	5	1	3	.....	.....	.....	2	.....	60	66	363	266
October	300	139	99	80	5	2	4	1	.....	1	3	1	54	32	465	256
November	160	120	65	64	4	2	1	2	1	.....	1	2	54	45	286	235
December	188	134	100	71	10	16	10	3	2	3	1	7	70	37	381	271
Total	2,797	1,993	998	1,148	169	224	27	17	3	13	19	21	653	622	4,648	4,038

NUMBER OF VALVES RAISED IN THE SEVERAL DISTRICTS DURING THE YEAR 1888.

Also, in each year since 1873.

Districts.	6-inch Barton.	8-inch Barton.	3-inch.	4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	36-inch.	Total.
First	.....	.....	2	2	6	.....	3	.....	1	.....	.....	.....	14
Second	6	.....	6	2	6	.....	1	.....	.....	.....	.....	.....	21
Third	.....	.....	.....	8	22	.....	3	.....	.....	.....	.....	.....	33
Fourth	.....	.....	.....	14	40	.....	3	1	1	.....	1	.....	60
Totals for 1888	6	.....	8	26	74	.....	10	1	2	.....	1	.....	128
" 1887	11	.....	11	16	61	.....	10	3	4	2	1	1	120
" 1886	12	.....	13	18	57	1	3	.....	.....	.....	1	.....	105
" 1885	.....	.....	11	24	97	1	9	.....	2	.....	1	.....	145
" 1884	.....	.....	7	13	71	1	4	2	1	3	6	1	109
" 1883	.....	.....	4	27	88	.....	8	.....	1	.....	1	1	130
" 1882	.....	1	14	25	58	1	5	1	.....	.....	1	.....	106
" 1881	.....	.....	15	44	90	.....	5	7	.....	.....	.....	.....	161
" 1880	.....	.....	7	23	47	.....	8	1	.....	.....	1	.....	87
" 1879	.....	.....	9	16	60	1	3	2	.....	.....	1	1	93
" 1878	.....	.....	27	22	100	.....	3	1	.....	1	1	.....	155
" 1877	.....	.....	12	6	50	.....	1	.....	.....	1	.....	.....	70
" 1876	.....	.....	3	17	49	.....	3	.....	.....	1	.....	.....	73
" 1875	.....	.....	17	55	120	4	12	2	4	1	2	.....	217
" 1874	.....	.....	13	32	111	6	6	3	3	.....	.....	.....	174
Totals for 15 yrs.	29	1	171	364	1,133	15	90	23	17	9	17	4	1,873

TABULAR STATEMENT OF WORK CONNECTED WITH THE DISTRIBUTION,

For the nine years, 1880 to 1888, inclusive.

Years.	Pipe.										Additional stops.	Additional fire hydrants.	Fire hydrants in use.	Meters in use.	Service Attachments.						
	Extensions.		Repairs and relays.		Total pipe handled.		Total amount in use.		Total amount handled.						½ in.	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	Total.
	Feet.	Pounds.	Feet.	Pounds.	Feet.	Pounds.	Feet.	Pounds.	Feet.	Pounds.											
1880.....	23,085	844,946	9,557	262,8:6	32,642	1,107,772	3,927,623	192,816,906	4,164,768	200,136,708	138	70	5,358	34	2,687	1 8	49	89	.....	.....	2,943.
1881.....	56,616	2,832,623	3,832	199,649	60,448	3,032,272	3,984,239	195,649,529	4,225,216	203,168,980	249	144	5,502	42	3,166	137	59	121	.....	.....	3,483
1882.....	56,860	5,396,165	7,740	484,092	64,600	5,880,257	*4,081,180	202,202,522	4,289,816	209,019,237	312	120	5,622	45	3,169	110	76	129	.....	.....	3,484
1883.....	63,215	3,048,645	12,605	675,420	75,880	3,724,065	4,144,395	205,251,167	4,365,696	212,773,301	281	130	5,752	63	4,576	97	71	133	.....	.....	4,877
1884.....	84,451	7,155,385	18,079	1,380,271	102,530	8,535,656	4,228,846	212,406,552	4,468,226	221,308,957	324	147	5,887	560	5,529	185	84	140	.....	7	5,945
1885.....	137,967	12,234,074	93,783	3,265,537	231,850	15,499,611	4,366,813	224,640,526	4,700,076	236,808,568	539	307	6,195	305	6,734	254	121	160	.....	16	7,285
1886.....	136,831	18,238,457	121,210	4,883,826	258,011	23,122,283	4,503,644	242,879,083	4,958,117	259,930,851	736	295	6,490	284	7,482	258	104	133	.....	32	8,009
1887.....	122,790	14,780,082	34,098	1,329,083	156,888	1 ,109,165	4,626,434	257,659,165	5,115,005	276,040,016	546	429	6,715	253	7,892	317	124	143	2	54	8,532
1888.....	133,552	6,356,379	45,943	1,486,631	179,495	7,843,010	4,759,986	264,015,544	5,294,500	283,883,026	772	214	6,929	267	8,260	193	139	118	23	55	8,788

* Including 40,081 feet of pipe laid by the Park Commission, Zoological Society, and Centennial Exhibition Company, in Fairmount Park.

MISCELLANEOUS WORK.

	Examinations.					Miscellaneous.							Meters tested.			Statements taken.
	Attachments.	Short supply.	Leaks.	Meters.	Totals.	Boxes repaired.	Sidewalks repaired.	New boxes put in.	New iron covers put on.	Fish traps set.	Service-pipes repaired.	Total.	Crown.	Hersey.	Total.	
January	20	9	4	13	46	.....	.....	4	.....	3	.....	7	2	1	3	1,151
February	22	10	5	8	45	1	.....	6	.....	2	7	16	17	1	18	1,007
March	20	4	5	22	51	1	.....	3	.....	7	.....	11	17	.....	17	1,013
April	60	16	15	14	105	.....	.....	1	.....	1	17	19	2	.....	2	369
May	55	16	13	9	93	1	.....	1	.....	4	7	13	14	1	15	295
June	24	9	5	6	44	.....	.....	.....	.....	2	12	14	7	.....	7	586
July	51	10	7	1	69	.....	.....	.....	.....	1	.....	1	7	.....	7	
August	49	14	8	5	76	.....	.....	.....	.....	.....	38	38				
September	30	3	10	9	52	3	.....	.....	.....	.....	22	25	.....	.....	.....	227
October	27	.....	11	12	50	.....	3	.....	.....	3	21	27	.....	.....	.....	249
November	34	6	9	23	72	5	2	2	2	2	18	31	1	.....	1	859
December	31	7	12	48	98	3	.....	14	1	8	1	27	.....	.....	.....	1,097
Totals	423	104	104	170	801	14	5	31	3	33	143	229	67	3	70	6,853

GENERAL SUMMARY OF METER OPERATIONS DURING 1888.

Style of Meter.	In use Jan. 1, 1888.							Set during 1888.		Totals.	Renewed.							Totals.	Discontinued.					Totals.	Meters dismantled by removing pistons.		Total in use December 31, 1888.					Stock on hand Dec. 31, 1888.							Totals.	Repaired.			Used in service.		
											Taken out.				Put in.				Taken out.				Dismantled.																						
	Crown.	Keystone.	Union.	Marsland.	Worthington.	Positive.	Total.	Crown.	Total.		Crown.	Worthington.	Hersey.	Total.	Crown.	Hersey.	Total.		Crown.	Keystone.	Worthington.	Positive.	Total.		Crown.	Total.		Crown.	Total.	Crown.	Union.	Marsland.	Worthington.	Total.	Crown.	Keystone.	Equitable.	Union.	Worthington.	Positive.	Total.		Crown.	Worthington.	Total.	Keystone.	Worthington.	Total.
½ inch..	2	...	...	...	...	...	2	.....	.....	2	...	...	...	...	...	...	...	2	...	...	...	...	...	.....	.....	.....	2	.....	.....	.....	2	31	...	...	...	...	...	31	33						
¾ " ..	20	1	..	...	...	...	21	.....	.....	21	1	.....	.....	1	.....	.....	.....	20	2	1	...	...	3	.....	.....	.....	17	.....	.....	.....	17	63	24	...	...	...	...	87	104	3	.....	3	1	.....	1
1 " ..	35	...	...	...	7	...	42	2	2	44	10	3	1	14	9	1	10	40	2	...	1	...	3	1	1	4	2	2	33	.....	.....	3	36	98	....	2	....	21	1	122	160	5	1	6	.....	1	1
1½ " ..	57	...	4	1	2	1	65	1	1	66	7	.....	.....	7	7	....	7	66	2	...	....	1	3	.....	.....	3	3	3	56	4	1	2	63	33	4	....	21	....	1	59	125	5	.....	5			
2 " ..	95	...	...	...	1	....	96	2	2	98	9	.....	.....	9	14	....	14	103	4	...	...	...	4	1	1	5	10	10	97	.....	.....	1	98	29	...	...	...	1	....	30	138	28	.....	28			
3 " ..	25	...	...	...	3	....	28	2	2	30	4	.....	.....	4	6	....	6	32	1	...	...	...	1	.....	.....	1	.....	.....	28	.....	.....	3	31	14	...	...	...	...	...	14	45	11	4	15			
4 " ..	17	...	...	...	...	...	17	2	2	19	3	.....	.....	3	1	...	1	17	...	...	...	...	...	.....	.....	...	2	2	17	.....	.....	.....	17	.....	...	...	...	...	...	.....	19	10	.....	10			
6 " ..	2	...	...	...	...	...	2	1	1	3	1	.....	.....	1	1	...	1	3	...	...	...	...	...	.....	.....	...	1	1	3	.....	.....	.....	3	.....	...	...	...	...	...	.....	4	4	.....	4			
Totals...	253	1	4	1	13	1	273	10	10	283	35	3	1	39	38	1	39	283	11	1	1	1	14	2	2	16	18	18	253	4	1	9	267	268	28	2	21	22	2	343	628	66	5	71	1	1	2

REMARKS.

The total number of meters in use, as shown in the report for 1887, included sixteen (16) meters that were dismantled.

The above corrected table shows the actual number set and in use January 1, 1888.

One ¾-inch Crown, one 2-inch Crown, and two 1½-inch Worthington meters in use—private. One 1-inch Hersey meter received on trial, and subsequently returned to manufacturers.

METERS DISMANTLED.

Ward.	Occupant.	Location.	Date when set.	Name of meter.	Size. 1-inch.	1½-inch.	2-inch.	4-inch.	6-inch.	Totals.	Average quantity of water used, 1887. Gallons.	Average quantity of water used, 1888. Gallons.	Remarks
16	Miller, C. W., & Co.....	171 to 179 Canal street.....	Feb. 11, 1884	Crown	.....	.....	2	.....	.....	2	7,886,802	7,886,802	
17	Dolan, Thos., & Co.....	S.E. cor. Howard and Oxford Sts.	April 19, 1881	Crown	.....	.....	.....	2	1	3	121,131,561	121,131,561	
19	Gay's, John, Sons.....	2001 Howard street.....	Mar. 22, 1884	Crown	.....	.....	3	.....	.....	3	10,213,678	10,213,678	
19	Taylor, Thos., & Sons....	S.E.cor.Howard and Lehigh Av.	April 12, 1881	Crown	.....	.....	1	.....	.....	1	6,227,354	6,227,354	
25	Martin, James, & Co.....	S.W. cor. Richmond & Tioga Sts.	April 10, 1884	Crown	1	3	1	.....	.....	5	35,942,313	35,942,313	
31	Bromley, John, & Sons..	N. E. cor. Front and Jasper Sts..	April 12, 1881	Crown	.....	.....	2	.....	.....	2	11,282,022	11,282,022	
16	McNeely & Co.....	N. W. cor. Charlotte & Canal Sts.	Jan. 29, 1884	Crown	1	.....	1	.....	.....	2	.....	6,702,080	
					2	3	10	2	1	18	192,683,730	199,385,810	

NEW METERS SET.

Ward.	Occupant.	Location.	Date when set.	Name of meter.	Size. 1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Totals.	Quantity of water used 1887. Gallons.	Quantity of water used 1888. Gallons.	Remarks.
5	Drexel, A. J.	S. E. cor. Fifth and Chestnut Sts.	July 19, 1888	Crown	.....	.....	.....	.....	1	.....	1	.....	484,105	
6	Wilbur, H. O., & Sons.	235 to 241 N. Third street..	Mar. 16, 1888	Crown	2	.....	.....	.....	.....	.....	2	.....	1,095,026	
8	Ingersoll, H.	1416 and 1418 Chestnut street.	May 17, 1888	Crown	.....	.....	.....	1	.....	.....	1	.....	386,491	
22	Carbott, J.	Berkley St., south of Green St.	May 31, 1888	Crown	.....	.....	.....	1	.....	.....	1	.....	3,912,788	
24	Smith, R., Brewing Co.	S.W.cor. 38th St. and Girard Ave.	Feb. 24, 1888	Crown	.....	.....	.....	.....	1	.....	1	.....	6,053,938	
24	Pennsylvania R. R. Co.	Forty-eighth St. and Elm Ave.	June 22, 1888	Crown	.....	.....	.....	.....	.....	1	1	.....	696,762	
25	Manz, G., Brewing Co.	S. E. cor. Sixth and Clearfield Sts.	May 21, 1888	Crown	.....	1	.....	.....	.....	.....	1	.....	2,913,579	
27	University Pa., M. D'pt.	S. E. cor. 36th and Locust Sts.	May 25, 1888	Crown	.....	.....	1	.....	.....	.....	1			
29	Baltz, J. & P., Brw'g Co.	N.W.cor. 31st and Thompson Sts.	May 25, 1888	Crown	.....	.....	1	.....	.....	.....	1	.....	276,238	
					2	1	2	2	2	1	10			

APPENDIX E.

REPORT

ON THE

Operations of the Construction and Repair Shop

DURING 1888.

BUREAU OF WATER.

CONSTRUCTION AND REPAIR SHOP,

TWELFTH AND REED STREETS.

Philadelphia, January 16, 1889.

JOHN L. OGDEN,
Chief Engineer.

SIR:—I respectfully herewith submit the Annual Report of the operations of the "Construction and Repair Shop" for the year ending Drcember 31, 1888.

Respectfully,

WM. F. COURTNEY,
Superintendent.

MERCHANDISE.	DR.
To Stock on hand January 1, 1888	$11,965 26
Bolts and nuts	1,012 82
Brass castings, 29,266½ lbs.	4,071 22
Brass fittings	599 74
Chandlery	169 45
Coal, 376,105 tons (2240)	2,256 25
Galvanizing, 7,311 lbs.	292 44
Gum goods	3,427 04

Hardware		$358 85
Iron castings, 706,495 lbs		18,968 76
Iron wrought, 75,584 lbs		1,768 58
Iron, pipe fittings		25 93
Lumber, 99,461 feet		2,800 24
Machinery		167 00
Miscellaneous		248 03
Oil and tallow		89 50
Paints, brushes, etc		171 30
Steel, 4,395 lbs		573 61
Wages		27,455 03
		$76,421 05

	MERCHANDISE.	CR.	
By First District, supplies and repairs	$10,692 78		
Second " " " "	9,378 25		
Third " " " "	12,344 65		
Fourth " " " "	19,393 73		
Fifth " " " "	2,607 35		
Sixth " " " "	7,018 89		
			$61,435 65

FAIRMOUNT PUMPING STATION.

By repairs to machinery	$941 63		
" to building and grounds	65 46		
			1,007 09

SPRING GARDEN PUMPING STATION.

By repairs to machinery	$808 72		
" to boilers	489 53		
" to buildings and grounds	40 81		
			1,339 06

BELMONT PUMPING STATION.

By repairs to machinery	$373 45		
" to boilers	62 99		
" to buildings and grounds	31 16		
			467 60

ROXBOROUGH PUMPING STATION.

By repairs to machinery	$478 03		
" to boilers	208 05		
" to buildings and grounds	5 07		
			691 15

CHESTNUT HILL PUMPING STATION..

By repairs to machinery	62	62

MOUNT AIRY PUMPING STATION.

By repairs to machinery	$322 25	
" to boilers	2 10	
		$324 35

FRANKFORD PUMPING STATION.

By repairs to machinery	$365 91	365 91

KENSINGTON PUMPING STATION.

By repairs to machinery	$98 50	
" to boilers	20 98	
" to buildings and grounds	6 86	
		126 34

MAIN OFFICE.

By supplies	$552 24	552 24

FERRULES.

By labor on corporation cocks	$49 53	49 53

DISTRIBUTION.

By supplies	$106 01	106 01

OLD METALS.

By sales	$859 75	859 75

WATER METERS.

By supplies	$552 24	552 24

FIXED PATTERNS.

By supplies and repairs	$1,267 26	1,267 26

MACHINERY.

By supplies and repairs	$1,879 66	1,879 66

GENERAL BUILDINGS AND GROUNDS.

East Park Reservoir, supplies and repairs	$1,837 73	
Repair shop, alterations and improvements	2,743 11	
		$4,580 84
		$75,283 02
Stock on hand January 1st, 1889		9,037 34
Cr		$84,320 36
Dr		76,421 05
Balance to Cr		$7,899 31

INVENTORY JANUARY 1, 1888.

7	4-inch stop valves, at $22 00	$154 00	
18	8-inch " " 30 00	540 00	
9	10-inch " " 40 00	360 00	
14	12-inch " " 45 00	630 00	
3	16-inch " " 60 00	180 00	
3	20-inch " " 95 00	285 00	
			$2,149 00
2	3-inch O. S. stop screws, at $1 50	$3 00	
1	4-inch " " " 2 25	2 25	
9	6-inch " " " 2 50	22 50	
1	10-inch " " " 4 50	4 50	
1	12-inch " " " 5 00	5 00	
15	16-inch " " " 6 50	97 50	
16	20-inch " " " 8 25	132 00	
3	36-inch " " " 12 00	36 00	
			$302 75
9	4-inch N. S. stop screws, at $2 25	$20 25	
8	6-inch " " " 2 50	20 00	
7	8-inch " " " 3 25	22 75	
7	10-inch " " " 4 50	31 50	
4	12-inch " " " 5 00	20 00	
2	16-inch " " " 6 50	13 00	
2	20-inch " " " 8 25	16 50	
4	30-inch " " " 10 25	41 00	
1	36-inch " " " 12 00	12 00	
			$197 00
3	Barton stop screws and bonnets, at $8 00	$24 00	
			$24 00

96	4-inch socket screws, at $1 50	$144 00	
90	6-inch " " " 1 75	157 50	
30	8-inch " " " 2 00	60 00	
56	10-inch " " " 2 25	126 00	
43	12-inch " " " 2 50	107 50	
29	3-inch " " " 1 50	43 50	
			$638 50
32	4-inch spindles, at $1 50	$48 00	
51	6-inch " " 1 75	89 25	
4	10-inch " " 2 25	9 00	
13	12-inch " " 2 50	32 50	
			$178 75
26	6-inch iron bands, at $2 15	$55 90	
8	10-inch " " " 5 00	40 00	
3	12-inch " " " 7 50	22 50	
3	16-inch " " " 10 00	30 00	
14	20-inch " " " 10 50	147 00	
3	30-inch " " " 15 00	45 00	
18	36-inch " " " 17 00	306 00	
			$646 40
12	pair c. i. monkey legs, at $1 50	$18 00	
23	pair w. i. monkey legs at 3 25	74 75	
26	cross heads and nuts, at $1 50	39 00	
276	wood plugs, at 50 cts	138 00	
148	brass plugs, at 50 cts	74 00	
141	iron plugs, at 50 cts	70 50	
3	wood stop boxes, at $2 50	7 50	
18	wood stop boxes, risers, at 35 cts	6 30	
14	iron plugs, risers, at $2 25	31 50	
4	iron hydrant keys, at $2 25	9 00	
12	iron street keys, at $5 25	63 00	
24	chisels, handle diamond point, at 35 cts	8 40	
3	chisels, hand gouge, at 50 cts	1 50	
1	chisel, hand gouge, at 60 cts	60	
2	chisels, pipe cutter, at 90 cts	1 80	
5	chisels, flat, at 35 cts	1 75	
12	chisels, cape, at 35 cts	4 20	
24	bursting wedges, at 35 cts	8 40	
10	½-inch drills, at 50 cts	5 00	
1	1½-inch reamer, at $3 50	3 50	
8	stub end straps, at $8 00	64 00	
41	hand caulking tools, at 50 cts	20 50	
7	handle caulking tools, at 90 cts	6 30	

5	caulking hammers, at $1 00	$5 00	
2	medium lead pots, at $2 50	5 00	
1	small lead pot, at $1 35	1 35	
6	dozen plug monkey keys, at 25 cts	1 50	
5	dozen stop monkey keys, at 75 cts	3 75	
			$4,810 50
8	pair hook bolts at 15 cts	$1 20	
12	dozen S. Hooks, at 75 cts	9 00	
11	dozen clevises, at 75 cts	8 25	
11	casket irons, at 60 cts	6 60	
4	D. E. brass plug wrenches, at 50 cts	2 00	
2	cap nut plug wrenches, iron, at $2 00	4 00	
1	T. end plug wrench, steel, at $2 25	2 25	
40	brass flushing nozzles, at $1 70	68 00	
2	reducing caps, brass, at $2 25	4 50	
2	reducing caps, iron, at $1 00	2 00	
1	pressure cap, brass, at $1 75	1 75	
4	crowheads, at $4 50	18 00	
20	plug monkeys, at $3 25	65 00	
9	mandrills for drill piece, at 75 cts	6 75	
2	sockets for drill piece, at 50 cts	1 00	
40	O. S. plug nuts, at 25 cts	10 00	
11	N. S. plug nuts, at 25 cts	2 75	
132	6-inch gum valves, at $5 00	660 00	
127	4-inch gum valves, at $2 25	285 75	
215	lbs. gum joint rings. at 44 cts	116 60	
97	lbs. sheet gum, at 44 cts	42 68	
90	lbs. Babbitt metal, at 20 cts	18 00	
	Finished parts stop cocks	77 00	
	Finished parts fire hydrants	59 50	
	Unfinished parts stop cocks	12 73	
			$6,295 81
3,286	lbs. unfiuished brass castings, at 12 cts	$394 32	
2,003	lbs. finished brass castings, at 20 cts	400 60	
16,076	lbs. iron castings, at 2 cts	321 52	
18,526	lbs. wrought iron, at 2½ cts	463 15	
3,210	lbs. steel, at 13 cts	417 30	
267	lbs. wrought iron forges, at 10 cts	26 70	
			$2,023 59
200	brass frost valves, 60 cts	$120 00	
325	lbs. rod burrs, at 20 cts	65 00	
150	lbs. brass wire, at 17 cts	25 50	
			$210 50

Hardware	$90 00	
Bolts and nuts	360 00	
Paints and brushes	4 44	
Oil and tallow	40 00	
Chandlery	13 00	
		$9,037 34

ARTICLES MANUFACTURED DURING 1888.

162 No. 1 fire hydrants, at $26 00	$4,212 00	
159 No. 2 " " " 33 00	5,247 00	
306 No. 3 " " " 34 25	10,480 50	
		$19,939 50
48 4-inch stop cocks, at $22 00	$1,056 00	
523 6-inch " " " 25 00	13,075 00	
25 8-inch " " " 30 00	750 00	
50 10-inch " " " 40 00	2,000 00	
26 12-inch " " " 45 00	1,170 00	
12 16-inch " " " 60 00	720 00	
6 20-inch " " " 95 00	570 00	
4 30-inch " " rotary 500 00	2,000 00	
4 36-inch " " at 360 00	1,440 00	
3 48-inch " " " 605 00	1,815 00	
		$24,596 00
52 4-inch socket screws, at $1 50	$78 00	
64 6-inch " " " 1 75	112 00	
4 10-inch " " " 2 25	9 00	
10 12-inch " " " 2 50	25 00	
		$224 00
5 4-inch iron bands, at $2 15	$10 75	
213 6-inch " " " 2 15	457 95	
42 8-inch " " " 4 00	168 00	
48 10-inch " " " 5 00	240 00	
29 12-inch " " " 7 50	217 50	
49 30-inch " " " 15 00	735 00	
20 36-inch " " " 17 00	340 00	
		$46,928 70
57 pairs C. I. monkey legs, at $1 50	$85 50	
63 pairs W. I. monkey legs at 3 25	204 75	
94 cross heads and nuts, at 1 50	141 00	
1064 wood plugs, at 50 cts	523 00	
882 brass plugs, at 50 cts	441 00	
472 iron plugs, at 50 cts	236 00	
1125 frames and covers, iron, 213,750 lbs., $1 69	3,612 38	
		$5,252 63

2	4-inch N. S. stop screws, at $2 25	$4 50	
7	8-inch " " " " 3 25	22 75	
5	10-inch " " " " 4 50	22 50	
2	20-inch " " " " 8 25	16 50	
2	30-inch " " " " 10 25	20 50	
			$86 75
½	dozen stop monkey keys, at 75 cts	38	
45⅓	F. hydrant monkey keys, at 25 cts	$11 42	
1520	stop boxes, wood at $2 50	3,800 00	
363	stop boxes, risers, wood, at 35 cts	127 05	
			$3,938 85
120	chisels, flat, at 35 cts	$42 00	
3	" hand gouge, at 50 cts	1 50	
14	" handle gouge, at 60 cts	8 00	
31	" " " diamond points, at 90 cts	27 90	
14	" hand " " at 35 cts	4 90	
91	" pipe cutters, at 90 cts	81 90	
10	" cape, at 35 cts	3 50	
			$170 10
9	medium lead pots, at $2 50	$22 50	
6	reducing caps, iron, at 1 00	6 00	
38	pairs hook bolts, at 15 cts	5 70	
69	dozen S. hooks, at 75 cts.	51 75	
37¾	dozen clevises, at 75 cts	43 31	
8	plug monkeys, at $3 25	26 00	
23	gasket irons, at 60 cts	13 80	
90	caulking irons, at 50 cts	45 00	
7	crowbars, at $1 15	8 05	
2	hammers, at 1 00	2 00	
12	T. E. plug wrenches, brass, at 50 cts	6 00	
171	iron wedges, at 35 cts	59 85	
59	iron plug risers, at $2 25	132 75	
60	screw jacks, at $1 05	63 00	
7	reamers, at $3 50	24 50	
3	ratchetts, at $26 50	79 50	
			$56,966 74

Stop Cocks, Frames, and Covers, Fire Hydrants, etc., delivered from Department Construction and Repair Shop during 1888, to Purveyors' Districts, Works, etc.

Districts.	Stop Cocks.										Stop Screws.						Stop	
	4-inch	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	36-inch.	48-inch.	6-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	36-inch.	Boxes.	Risers.
First	5	109	2	13	5	9	2	.....	...	...	...	..	...	...	...	...	...	233	144
Second	5	74	6	6	4	...	...	.....	...	...	...	...	...	...	...	...	...	302	97
Third	7	116	5	5	2	...	4	1	...	...	6	...	1	...	...	1	...	464	84
Fourth	9	112	6	15	8	...	...	8	3	3	1	...	1	...	...	1	...	288	36
Fifth	1	36	.....	.....	.....	...	1	1	...	...	1	...	1	2	2	...	...	48	.....
Sixth	12	85	.....	3	2	...	...	.....	...	...	1	1	...	...	...	...	...	213	.....
Works	2	.....	.....	1	2	...	...	.....	1	...	...	...	...	...	...	..	1	15	.....
	41	532	19	43	23	9	7	10	4	3	9	1	3	2	2	2	1	1,613	361

Stop Cocks, Frames, and Covers, etc.—*Continued.*

Districts.	Iron Bands.										Socket Screws.				Stop				
	4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	36-inch.	48-inch.	3-inch.	4-inch.	6-inch.	10-inch.	Monkey Legs, Cast Iron.	Monkey Legs, Wrought Iron.	Cross Heads and Nuts.	Nuts.	Spindles.	Barton Bonnet and Screw.
First	...	12	...	...	...	12	...	...	...	...	1	...	7	1	17	4	1	18	18	.....
Second	...	60	12	6	6	6	...	...	...	...	...	18	2	6	25	18	30	12	6	5
Third	...	.....	...	...	...	...	4	22	2	...	...	54	36	6	9	34	42	20	24	.....
Fourth	...	36	30	36	24	1	...	24	...	6	...	18	36	6	18	.....	5	.....	27	2
Fifth	6	14	...	...	...	...	...	...	...	...	...	6	6	...	2	.....	.....	.....	.....	.....
Sixth	...	96	...	...	...	...	...	...	...	...	..	...	..	...	.....	.....	.....	.....	.....	.....
Works	...	.....	...	...	1	...	...	..	...	...	...	...	...	...	.....	.....	.....	.....	.....	.....
	6	218	42	42	31	19	4	46	2	6	1	96	87	19	71	56	78	50	75	7

List of Articles delivered to the Purveyors' Districts, Works, etc.—*Continued.*

Districts.	Fire Hydrants.			Keys.			Chisels.							Plugs.			Frames and Covers.	Reducing Caps.	Pressure Caps.	Lead Pots.
	1-Way.	2-Way.	3-Way.	Street.	Hydrant.	Fire Hydrant Monkey Keys.	Flat.	Hand Gouge.	Handle Gouge.	Hand Dia. Pts.	Handle Dia. Pts.	Pipe Cutters.	Caps.	Wood.	Iron.	Brass.				
First	27	25	64	...	3	111	26	...	...	12	...	.....	...	226	145	30	275	. .	...	2
Second	32	41	33	...	...	288	48	24	18	54	24	60	...	165	84	300	250	...	...	6
Third	43	38	82	...	...	.....	.....	...	...	.....	...	.....	...	180	96	84	150	...	...	3
Fourth	26	33	89	...	...	48	12	...	6	42	...	.....	...	222	6	108	275	4	2	6
Fifth	5	16	6	...	...	84	6	...	...	6	...	12	...	60	.....	30	75	...	...	1
Sixth	40	27	33	...	...	.....	.....	...	...	.....	...	12	...	174	.....	60	100	...	...	...
Works	.....	.....	.....	2	...	.....	64	2	...	.....	...	18	6	.....	.....	122	.....	1	...	1
	173	180	307	2	3	531	156	26	24	114	24	102	6	1,027	331	734	1,125	5	2	19

List of Articles Delivered—*Continued.*

Districts.	Hook Bolts.	S Hooks.	Clevises.	Plug Monkeys.	Gasket Irons.	Caulking Irons.	Crow Bars.	Hammers.	Wrenches.	Wedges.	Plug Risers.	Eye Bolts.	Tail Clamps.	Stud End Straps.	Lead Skimmers.	Screw Jacks.	Reamers.	Ratchets.
First	4	252	108	.....	3	23	.....	4	4	8	1	.....	.....	.....	1	.....	.....	.....
Second	8	360	156	6	6	.....	.....	5	4	12	25	.....	.....	.....	1	.....	4	.....
Third	20	.....	216	.....	.....	.....	.....	.....	1	12	.....	.....	.....	.....	2	6	.....	.....
Fourth	2	168	96	6	6	18	.....	2	2	12	.....	72	12	.....	2	.....	3	.....
Fifth	.....	48	48	6	.....	.....	2	2	2	.....	12	18	.....	.....	.....	.....	.....	.....
Sixth	.....	48	.....	.....	6	15	.....	.....	.....	.....	7	184	102	.....	.....	.....	.....	.....
Works	.....	.....	.....	.....	.....	.....	5	.....	12	103	.....	.....	.....	4	.....	3	.....	3
	34	876	624	18	21	56	7	13	25	147	45	274	114	4	6	9	7	3

APPENDIX F.

REPORT OF JOHN E. CODMAN,

IN CHARGE OF HYDROGRAPHIC WORK.

BUREAU OF WATER,

Philadelphia, January 22, 1889.

JOHN L. OGDEN, ESQ.,
Chief Engineer.

DEAR SIR:—The following report of progress during 1888 of the Hydrographic work in connection with the investigation of sources for a future water supply is respectfully submitted.

The following streams have been gauged throughout the entire year at the several gauging stations established in 1886, viz.: The Perkiomen Creek, at Frederick Station, on the Perkiomen Railroad; the Neshaminy Creek, a short distance below the Forks, formed by the meeting of Big and Little Neshaminy Creeks and the Tohickon, at Point Pleasant.

Rainfall observations have been taken at all the stations established by the Bureau, and the observers have been required to keep the record in a careful manner, and forward them promptly to this office.

Two of the volunteer rainfall records are reported as incomplete. This breaks up a series of observations that were just about becoming of value; especially is this so in the case of the observations at Schuylkill Haven, in the Schuylkill Valley, which were furnished by E. F. Smith, Superintendent of Canals at Reading. These observations had been carried on

for a period of eight years, and were of value because they were taken at a point near the head waters of the main branch of the Schuylkill.

Mr. Thomas H. Walton, one of the gauge observers at Doylestown, employed by the Bureau of Water, was removed by death during the past year. His place has been filled by his son, and the record is still continued unbroken.

The automatic rain gauge, formerly at Thirteenth and Spring Garden streets, has been removed and placed in the small building used as a wachman's office, at the storage yard, Thirty-second and Spruce streets. The location is a very favorable one for making this class of observations; no buildings or trees of any size are in the neighborhood. The building is low, and the collector is placed upon the roof 17 feet from the ground. A lead pipe leads from this to the automatic recording apparatus inside, and beneath the recording arrangement is placed a copper receiver, made in the proportion of 10 to 1, and the rainfall, after being recorded upon the prepared sheets, falls into the receiver, and is carefully measured again, and the result compared with the paper record.

The collector has been increased to 22⅝ inches in diameter, or ten times its former area. A rainfall of .05 of an inch will be recorded by a line 5 inches long in its vertical height on the recording sheet.

The time of the beginning and ending of the rain, unless it is very light, is now clearly defined, and it is possible to measure a rainfall of .001 of an inch.

Two gauges, one of 2 inches in diameter and one of 7¼ inches in diameter, were placed at the same level above the ground as the larger gauge, and within a few feet of it, for the purpose of making comparisons. The observations have not been continued long enough to record any material difference, except that in a majority of cases the 2-inch gauge shows the largest amount of rainfall, but the greatest difference is not more than .10 or .15 of an inch in each inch of

rainfall. The 7¼ inch diameter and the 22⅝ inches diameter shows about the same amount in each.

The amount of rainfall in each gauge is measured at the end of each storm, and compared. Observations are taken each day at 8.30 A. M., and recorded for the preceding twenty-four hours.

A gauge for measuring the amount of snow fall, consisting of a 2-inch brass pipe, about 30 inches long, supported by an iron stand is placed in the open lot during a snow fall and the amount of snow caught in the gauge, melted into water, and carefully measured.

The observations on the rainfall at this station are of considerable value in recording the time of beginning and ending of a storm during the night, also the exact amount of rainfall for any given period of time and the rate of fall.

It is also to be observed that the observations made during the past year differ slightly from those recorded by the Signal Service Station at Ninth and Chestnut streets; this is accounted for by difference in locality and elevation above the ground, the Signal Service gauge being 140 feet; the gauge at Thirty-second street 17 feet above the ground.

The months of greatest precipitation were January, March, August and September. Three heavy falls of rain are recorded for August and three for September.

The average rain fall for Eastern Pennsylvania for 1888 is above the annual average. The average annual rainfall at the Pennsylvania Hospital, Philadelphia, for the past sixty-four years is 44.593 inches, and for 1888 it is 49.92. The average annual rainfall at the U. S. Signal Service Station, Philadelphia, for seventeen years, is 40.575 inches, and for 1888 it is 44.10 inches.

The average for nineteen stations in the water shed of the Perkiomen, Neshaminy, and Tohickon streams where observations have been obtained for the past six years for the Water Bureau is for 1888, 50.80 inches, and for the period of six years the average annual rainfall is 47.30 inches. The rain

fall of 1888 is 3½ inches above the average, and a corresponding increase is shown in the annual flow of the streams.

Most of the rain storms occurring during the year were noted more for the large area of country covered by them and the steady fall of rain for periods of twenty-four hours, or more than for any extraordinary rain fall in a short period of time. The storm of September 20th being the heaviest for a short period of time, where a fall of 1.33 inches fell in fifty minutes; about the same amount was recorded at the U. S. Signal Service Station, and also at all the stations in the Schuylkill Valley, the storm being general throughout Eastern Pennsylvania.

The average temperature from the records kept at the U. S. Signal Service shows that this year has been considerably below the average. No records of temperature are kept at any of the stations where observations are recorded for the Bureau.

Table 2 shows the average percentage of rainfall reaching the streams for each month during the five years observations have been taken. The month of March shows the greatest amount for the Perkiomen and Neshaminy, and the month of February for the Tohickon.

The snow fall of the preceding months is melted and carried into the stream at this time.

The month of least percentage is October for all three, following the warm summer months.

During 1888 the largest percentage occurred in February and the least in July for all three of the streams. An addition to this table shows the maximum and minimum percentage reaching the streams for each month in a period of five years.

This gives the Perkiomen for the summer months of June, July, and August, and the two fall months of September and October an average maximum percentage of 40 and an average minimum percentage of 13, or a total average of 22.6. The Neshaminy for the same period of time has an average maximum of 27 and an average minimum of 4, or a total average of 12.

The Tohickon for the same period of time has an average maximum of 47, an average minimum of 4½, or a total average of 19. The average daily yield of the Perkiomen at Frederick for the five years during which observations have been made is 175,502,807 gallons.

The yield by table 3 of the same stream for 1888, is 216,249,477 gallons per day, or 23 per cent. in excess of the average, with a rainfall in the water shed of 8 per cent. above the average.

The average daily yield of the Neshaminy for the past five years is 153,000,000 gallons.

The yield by table 3 of the same stream for 1888, is 188,666,701 gallons per day, or 23 per cent. in excess of the average, with a rainfall in the water shed of 6 per cent. above the average.

The average daily yield of the Tohickon for the past five years is 148,026,700 gallons. The yield by Table 3 of the same stream for 1888, is 193,533,751 gallons per day, or 30 per cent. above the average, with a rainfall in the water shed of nearly 10 per cent. above the average.

Table 4 shows the average yield in cubic feet per second per square mile of drainage area, also the average yield in cubic feet per second per square mile of drainage area for each inch of rainfall, and is compared with the Sudbury and Croton water sheds.

The table seems to show that the Tohickon gives much larger results than either of the other two. This may be partly accounted for by the rapid fall of the stream from its sources and the steep inclination of the water shed to the stream, making great variations in the flow at different periods of the year. Observations on this stream to be of value should be continued for a longer series of years.

The three automatic stream gauges in use at the different stations have, with care and attention, given very fair results, the repairs have been small, and breaks were chiefly caused

by high water, breaking of the float chains and ice. All these are now in good order.

The new automatic rain gauges are all in good condition and give satisfactory results.

The eight common rain gauges with some small repairs are in good condition.

New gauge boards have been ordered, and will be made by the workmen in the Bureau, for the stream stations, to replace those injured by ice and weather.

The mill at Stover's dam, on the Tohickon, near the gauging station, has been used by the Bureau with the consent of Mr. Stover for storing the instruments and materials used at the station. Since the first of the year the mill has been leased to new parties, and it became necessary to obtain a new place.

A room has been partitioned off in the loft of the saw mill large enough to store all the instruments belonging to the department.

The following named persons have been engaged on the work during the entire year:

John G. Hilsman, rodman.

George W. Wood, rodman.

R. C. Stover, rodman.

E. F. Heavener, gauge observer.

George Lowder, gauge observer.

Dr. J. A. Roth, gauge observer.

Thomas H. Walton, deceased.

Alfred H. Walton, gauge observer.

The Bureau is indebted to the following named persons who have kindly furnished rainfall records:

Mr. Thomas Meehan, Germantown, Philadelphia, Pa.

Mr. J. L. Heacock, Quakertown, Pa.

Sergeant L. M. Dey, U. S. Signal Service, Philadelphia.

Sergeant T. F. Townsend, State Weather Service, Philadelphia.

Mr. Benjamin Shoemaker, Pennsylvania Hospital, Philadelphia.

Mr. E. F. Smith, Chief Engineer of Canals, Reading, Pa.
Mr. Thomas J. Beans, Moorestown, N. J.
Dr. Charles Moore, Pottstown, Pa.
Mr. George W. Hayes, Surveyor, Lebanon, Pa.
Professor Seldon, Lafayette College, Easton, Pa.
Professor J. W. Moore, Lafayette College, Easton, Pa.
Dr. J. C. Green, West Chester, Pa.

Several observations have been made on the stream flow of the Tohickon at high water, and compared with the curve previously made; this will be continued during the present year.

Observations on the weir were not made during the past summer owing to high water and the flooding of the weir. The crest was swept away by the ice in January, 1888, and a new one was made and prepared. This will be placed in position as soon as the weather permits this season.

Respectfully,

JOHN E. CODMAN,

Assistant Engineer in charge of Hydrographic Work.

TABLE 1.

Rain-storms of Greatest Intensity as Recorded by Automatic Gauges during 1888.

Station—Bureau of Water, Philadelphia.

Date. 1888.	Total Fall.		Heavy Fall.		Maximum Fall.		
	Amount, Inches.	Duration, Hrs. Min.	Amount, Inches.	Duration, Hrs. Min.	Amount, Inches.	Duration, Hrs. Min.	Rate per Min. Inches.
January 1-2...	1.650	26 00	.....	Snow	and	Rain.	
March 11-12...	2.540	.....	Snow	and	Rain—	Bliz-	zard.
July 10.....	1.760	29 15	0.45	0 40	0.215	0 18	0.012
August 3.....	0.867	0 45	0.80	0 12	0.80	0 12	0.015
August 8.....	0.982	2 50	0.90	0 15	0.41	0 08	0.051
August 13.....	1.285	18 40	1.00	1 05	0.20	0 06	0.033
August 23.....	2.465	14 45	1.00	1 06	0.34	0 10	0.034
Sept. 8-9.....	1.565	.....	.....	.....	0.32	0 15	0.021
Sept. 16-17.....	2.194	24 05	{ 0.90 0.70	{ 1 00 1 00	0.55	0 16	0.035
Sept. 20.....	1.35	4 26	1.33	0 50	1.33	0 50	0.026
November 10.	1.075	9 15	0.95	2 10	0.85	0 40	0.021
November 15.	1.285	14 15					
December 7...	2.430	29 40	1.50	5 00			

Station—Frederick, Montgomery County, Pa.

Date. 1888.	Total Fall.		Heavy Fall.		Maximum Fall.		
	Amount, Inches.	Duration, Hrs. Min.	Amount, Inches.	Duration, Hrs. Min.	Amount, Inches.	Duration, Hrs. Min.	Rate per Min. Inches.
January 1.....	1.622	19 10	.....	Snow	and	Rain.	
March 11-12...	2.070	.....	Snow	and	Rain—	Bliz-	zard.
August 21.....	2.610	16 10	1.50	1 40	0.41	0 12	0.034
Sept. 17.....	3.185	33 15	2.00	4 10	0.50	0 20	0.0250
Sept. 21.....	0.47	0 25	.....	.....	0.44	0 08	0.055
Dec. 17-18.....	3.34	25 30	1.00	4 30	0.50	2 00	0.041

Station—FORKS OF NESHAMINY, BUCKS COUNTY, PA.

DATE. 1888.	TOTAL FALL.		HEAVY FALL.		MAXIMUM FALL.		
	Amount, Inches.	Duration, Hrs. Min.	Amount, Inches.	Duration, Hrs. Min.	Amount, Inches.	Duration, Hrs. Min.	Rate per Min. Inches.
January 1.....	1.901	23 00	.....	Snow	and	Rain.	
March 11-12...	2.380	17 00	Snow	and	Rain—	Bliz-	zard.
June 23.....	1.600	3 45	1.500	0 45	1.00	0 16	0.0625
July 10.....	0.990	27 45	0.500	5 00	0.45	1 30	
August 21.....	1.820	8 10	1.000	2 15	0.25	0 12	0.021
Sept. 9.....	2.850	42 55	1.000	0 30	0.38	0 08	0.047
Sept. 17.....	2.710	46 00	1.090	0 36	0.50	0 12	0.042
Sept. 21.....	0.668	0 55	0.508	0 24	0.40	0 08	0.050
October 8.....	1.420	14 45	0.425	0 09	0.30	0 10	0.030
Dec. 17-18.....	2.400	19 00	1.000	1 10	0.28	0 28	0.010

TABLE 2.

Comparative Statistics of Sundry Watersheds.

Watersheds.	Area in miles	Statistics of Watersheds in Percentages of Total Area.				Percentage of Rainfall Reaching Stream.												
		Wooded.	Cultiva'd.	Flats.	Roads.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Perkiomen, at Frederick, five years	152.0	25	71	2	2	80	84	115	93	35	24	16	36	24	13	42	60	49
Neshaminy, below Forks, five years	139.3	6	92	¼	2	97	104	107	86	28	14	12	14	12	7	28	73	47
Tohickon, five years	102.2	24	72	2	2	117	133	128	102	28	24	17	18	20	14	49	57	60
Average.																		
Perkiomen, at Frederick... Maximum in five years						93	111	191	114	40	36	24	52	50	37	72	66	
Perkiomen, at Frederick... Minimum in five years						72	49	65	44	29	13	8	19	17	9	25	32	
Neshaminy, below Forks... Maximum in five years						103	138	177	122	36	23	24	21	38	28	67	85	
Neshaminy, below Forks... Minimum in five years						91	78	62	46	18	5	2.	9	3	2	14	47	
Tohickon... Maximum in five years						138	191	190	148	48	53	40	37	66	38	85	80	
Tohickon... Minimum in five years						103	74	90	42	17	9	2	7	2	2	18	49	

TABLE 3.—Yield of Sundry Streams for the Year 1888.

1888.	Perkiomen at Frederick.			Neshaminy below Forks.			Tohickon.		
	Monthly yield.	Average daily yield.		Monthly yield.	Average daily yield.		Monthly yield.	Average daily yield.	
	Cubic feet.	Cubic feet.	Gallons.	Cubic feet.	Cubic feet.	Gallons.	Cubic feet.	Cubic feet.	Gallons.
January	1,281,500,352	41,338,721	309,627,020	1,494,374,400	48,205,625	361,060,131	1,529,452,800	49,337,187	369,535,530
February	1,554,164,064	53,591,864	401,403,061	1,777,386,240	61,289,180	459,005,958	1,595,937,600	55,032,331	412,192,159
March	1,809,374,976	58,366,934	437,168,335	1,584,921,600	51,126,503	382,937,507	1,489,708,800	48,055,122	359,923,863
April	1,218,582,144	40,619,403	304,239,329	907,822,080	30,260,736	226,652,912	1,018,362,240	33,945,408	254,251,105
May	325,728,000	10,507,355	78,700,088	171,288,000	5,525 420	41,385,396	123,569,280	3,986,106	29,855,933
June	136,218,240	4,540,608	34,009,125	65,059,200	2,168,640	16,242,113	39,320,640	1,310,688	9,816,453
July	88,534,080	2,855,938	21,390,975	49,040,640	1,581,956	11,848,849	18,377,280	592,815	4,440,184
August	538,773,120	17,379,778	130,174,537	215,438,400	6,949,626	51,852,699	420,024,960	13,549,192	101,483,418
September	1,295,775,360	43,192,512	323,511,914	847,082,880	28,236,096	211,488,359	1,294,3 .3,840	43,144,128	323,149,518
October	442,117,440	14,261,859	106,719,189	344,995,200	11,128,877	83,355,278	368,591,040	11,890,033	89,046,347
November	876,795,840	29,226,528	218,629,598	754,643,520	25,154,784	188,170,840	740,033,280	23,872,041	178,575,2 7
December	1,012,893,120	32,673,972	244,418,269	1,018,859,760	32,866,444	245,858,059	831,340,800	26,817,445	200,608,407
Totals	10,580,456,736	28,908,352	216,249,477	9,230,911,920	25,221,071	188,666,701	9,469,042,560	25,871,701	193,533,751

TABLE 4.

Average Annual Yield of Sundry Streams.

Watersheds.	Area in Miles.	Rainfall.	Average annual yield in galls.	Average daily yield in galls.	Average yield in cubic feet per second per sq. mile of drainage area	Average yield in cubic ft. per second per sq. mile of drainage area for each in. of rainfall.
Perkiomen, at Frederick, 5 yrs..	152.0	46.926	64,058,524,706	175,502,807	1.786	0.037
Neshaminy, below Forks, 5 yrs..	139.3	47.601	55,835,360,616	153,000,000	1.732	0.036
Tohickon, 5 years.....	102.2	49.350	54,029,524,455	148,026,700	2.212	0.045
Sudbury, Mass. 6 years.....	70.0	46.100	29,606,810,000	81,040,500	1.615	0.035
Croton, N. Y., 6 years.....	361.0	46.500	106,600,000,000	440,000,000	1.890	0.041

TABLE 5.

Observed Minimum Stream Flow and Minimum Flow during 1888.

Stream.	Previous Observed Minimum Flow.	Minimum Flow, 1888.	Date.
	Cubic ft. per 24 hours.	Cubic ft. per 24 hours.	
Perkiomen, at Frederick...	653,184	1,140,480	August 20.
Neshaminy, at Forks.....	108,864	635,680	July 24.
Tohickon.....	17,280	190,080	July 21.

Maximum Stream Flow, 1888.

	Cubic ft. per 24 hours.	
Perkiomen, at Frederick.....	458,352,000	September 18, 1888.
Neshaminy, below Forks.....	422,506,368	January 1, 1888.
Tohickon.....	479,191,686	September 18, 1888.