

THIRD ANNUAL MESSAGE
OF
JOHN WEAVER

MAYOR OF THE CITY OF PHILADELPHIA

WITH THE

Annual Reports

OF

A. LINCOLN ACKER

Director of the Department of Public Works

AND OF THE

CHIEFS OF BUREAUS

Constituting said Department

FOR THE

Year Ending December 31, 1905

ISSUED BY THE CITY OF PHILADELPHIA

1906

VOLUME II

PHILADELPHIA

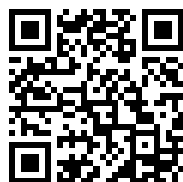
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OFFICE OF THE MAYOR PHILADELPHIA

Mayor
JOHN WEAVER

Secretary
ROBERT GRIER

Chief Clerk
GEORGE W. SEEDS

Contract and License Clerk
JOSEPH F. JONES

Stenographer
MARGARET FORDERER

Clerk
GEORGE A. WELSH

Ass't Stenographer and Typewriter
WALTER A. WOOD

Messenger
WALKER B. WEBB

Secretary Civil Service Board
FRANK M. RITER

Stenographer
JOSEPH MARCUS

Clerk
BERTHA BRAY

THIRD ANNUAL MESSAGE

OFFICE OF THE MAYOR, CITY HALL

Philadelphia, April 2, 1906.

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

GENTLEMEN:—In accordance with the provisions of the Act of Assembly of June 1, 1885, I transmit to your Honorable Bodies my third annual message, with a statement of the finances and the general conditions of the City.

FINANCES.

The financial condition of the City is very satisfactory. As will be seen by the City Controller's Report there was expended during the year upwards of \$31,000,000.00. Notwithstanding these large total disbursements, we came out of the year without a temporary loan and with no deficiencies for 1905 to make up, and with a surplus at the end of 1905 of \$1,670,937.33. I take the liberty of quoting from Captain Walton's report of January 13, 1906, as follows:

“I am pleased to announce a most gratifying result shown by the closing of the accounts of the City for the year 1905. The estimated surplus reported on August 1st last, of \$641,834.03, has been exceeded by \$1,029,103.30, the total figures now reached

being \$1,670,937.33. This amount added to the balance remaining unappropriated, of \$22,600.92 for 1906 gives a further sum at the disposal of your Honorable Bodies of \$1,693,538.25, thus obviously dispensing with the need of any temporary loans during the current year the carrying forward of which to the succeeding year has been a feature of the annual reports of this Department prior to December 31, 1904."

This surplus was brought about by the cutting down of expenses in the various bureaus and departments in the City subsequent to May 22, 1905, and has nothing whatever to do with the stoppage of work on certain contracts pending their investigation, because all the moneys appropriated on those contracts were from loans, and they did not merge at the end of 1905. The amount under contract not merging on December 31, 1905, was \$14,234,971.46.

After the most persistent efforts we have succeeded in cutting down the payments by mandamuses, these payments for the year 1905 showing a reduction of upwards of \$800,000 on those of the previous year, and this enabled us to pay \$375,000 of a temporary loan authorized for the dredging of the Delaware River; upwards of \$200,000 for land damages incurred in taking property for the extension of Fairmount Park, and a considerable sum for emergencies for the Department of Public Health and Charities.

The total value of real estate in the City of Philadelphia for the year 1905, upon which the tax rate for the year 1906 was levied, is \$1,214,056,440, which is divided up as follows:

Real Estate, City rate,	\$1,122,351,320
Real Estate, Suburban rate,	64,832,285
Real Estate, Farm rate,	26,872,835

For two years now we have been working under the reduced tax rate of \$1.50 and the effort to equalize assessments. While there has been a great stride forward in the equalization of the assessments, it has not been as satisfactory as I have wished, for we still hear of a number of instances in which properties are sold for from fifty to a hundred per cent. more than they are assessed at in the central wards of the City, and a number of instances in which the small dwelling houses in the outlying wards of the City are sold for less than the assessed value. This is something that should be remedied, but the chief agency for remedying this inequality I believe will be the publication every year of all the assessments, and the distribution of the same to the property owners. I have advocated this every year, but the publication has only been made one year and then not till May of 1904. This list was published through one of the morning newspapers, and distributed to every house in the city. I recommended in my annual message last year that the publication of these assessments should be made, and asked for an appropriation for this purpose, and also recommended that the publication should be made earlier in the year before the citizens started to pay their taxes. I again most urgently recommend the appropriation of sufficient money to publish these lists, and that they be published within the first three months of every year.

During the past two years I have made many investigations as to conditions in other cities in order to compare them with our own condition, and one matter has struck me as being of great interest to our citizens. The City of Boston, with a population of a little more than one-third of the population of Philadelphia, and with a geographical area very much less, has its real estate valued at almost the same as the valuation of the entire real estate of the

County of Philadelphia, and inasmuch as its tax rate is the same, \$1.50, it gives the City of Boston—a City, as I have said before, only a little more than one-third the size of the City of Philadelphia, very much less than one-half the size—almost the same amount of revenue as the City of Philadelphia has. I have made investigations of amounts expended in other cities, and have come to the conclusion that there is no large city in the country that is financed at the present time as economically as the City of Philadelphia, taking into consideration the ratio of population and geographical area.

LOANS.

The City is limited in her borrowing capacity by the general laws of the State to seven per cent. (7%) of the assessed value of her real estate. Inasmuch as the value of the real estate in 1905 was \$1,214,056,440, her borrowing capacity would be \$84,983,950. The funded debt of the City on December 31, 1905, was \$67,986,820.22, it having been decreased during the year by payments of maturing loans amounting to \$1,865,000. The Sinking Fund Commissioners held City loans amounting to \$6,361,500, and this deducted from the \$67,986,820.22, leaves the net funded debt on January 1, 1906, \$61,625,320.22.

Inasmuch as the net funded debt on the first of January, 1905, was \$65,474,220.22, it shows a decrease in the net funded debt during the year of \$3,848,900. This decrease was brought about first by the payments of loans maturing, as above stated, of \$1,865,000, and of the purchase by the Sinking Fund Commissioners during the year of additional City loans. The borrowing capacity of the City on the first of January, 1906, was upwards

of \$23,000,000, but there has been authorized a loan on June 17, 1898, for Public Library, \$1,000,000; same date for Art Gallery, \$200,000; same date for Grade Crossings, \$200,000, and in November, 1905, for Grade Crossings, \$4,000,000, making \$5,400,000 authorized to be borrowed, but not borrowed, which will leave the net borrowing capacity of the City on January 1, 1906, a little over seventeen and a half million dollars. This net borrowing capacity of the City will be increased during the year to about \$20,000,000 unless it shall be necessary to authorize additional loans sometime during the year.

FIRE INSURANCE FUNDS.

During the year 1904 by the authority of an ordinance passed by your Honorable Bodies, all insurance policies upon City property were cancelled and the premiums paid into the hands of the Sinking Fund Commissioners to invest and accumulate until it reached \$250,000 to meet any loss which should be occasioned by fire.

On the first of January, 1905, the Sinking Fund Commissioners had in their hands \$150,000 in this fund. In ten years prior to this time the City of Philadelphia had not collected \$5,000 for damages for loss by fire, but early in last year a very disastrous fire occurred to the Boys' Central High School, damaging it to the extent of \$100,000, which depleted the fund very much, but after the payment for all the repairs, we shall still have upwards of \$83,000 left in this fund, and I hope that we shall now go along and accumulate a large sum of money. I suggested in my last annual report that it might be well to allow the fund to accumulate to \$500,000 rather than to \$250,000.

In the Controller's report of last year he complimented the City upon having collected the taxes levied against real estate up to within $3\frac{1}{2}$ per cent. As he said at that time, "A smaller sum outstanding than has hitherto been shown." I am glad to say, however, that the work this year has been even better than last year because the delinquencies for 1905 is a fraction under 3 per cent., nearly all the departments and bureaus showing an increase of receipts over the year 1904.

I desire to refer again to the subject of mandamuses. While the payments were very much less this year than in the last two or three years, I notice that the chief payments for 1905 were \$769,974.08 for the opening and widening of streets, and \$339,958.17 for changes of grades. I have established a rule for my own conduct in these matters that unless there is some urgent public necessity for the opening of a street that I would not sign an ordinance for opening unless there was a dedication to the City of Philadelphia of the bed of the street, for, as I had occasion to say to you in my last annual message, "In the majority of instances where streets are opened, it is for the benefit of the property holder, and increases the value of his property to such an extent that he can very well afford to dedicate to the City the bed of the street and still make a handsome profit on the development of the remaining ground." If the City should be compelled to pay for all the land taken in opening streets and for damages for changes of grade without reference to the increase in value of the adjoining property, it would be a burden that the City could never bear, and would be absolutely unjust to the majority of the tax payers. In some instances a property owner is willing to dedicate his part of a block for the opening of a street, but finds another owner who is not willing, and who re-

fuses to do so. The property is absolutely valueless except as building sites, and cannot be used as building sites until the streets are opened, all the municipal structures built under the street and the street paved, and of course all this increases enormously the value of the property as is recognized by the man who is willing to dedicate, and it is dedicated, and yet the other owner goes before a Road Jury and gets large damages from the City for the opening of the street and increasing the value of his property. The system is so manifestly unjust that I cannot help referring to it again and again. The whole trouble, it seems to me, is with the Road Jury system. I have within the last few weeks had an instance brought to my attention of the awarding by a Road Jury of upwards of \$500,000 to property owners as damages for the widening of Broad street sixty feet just north of League Island Park. The property taken in this widening is about five acres so that the damages awarded are a little over \$100,000 an acre. I had a calculation made by Chief Webster, which showed that the valuation put upon this property by the award of the Road Jury, if placed upon all the land in the City of Philadelphia clear of all buildings, would make that land worth over \$8,000,000,000, while the assessment of all the property with the buildings erected thereon is only \$1,200,000,000, and this particular property is believed to be worth less than the property in any other section of the City because it is so low, part of it below high water mark and protected by the artificial banks from the high tides in the Delaware and the Schuylkill rivers. These instances could be multiplied, and, to my mind, the Road Jury system in vogue in the City of Philadelphia at the present time is alarming, and I would suggest that a committee

be appointed to investigate the Road Jury system, and to make a report with a view to memorializing the next Legislature of Pennsylvania for some remedial legislation.

ADVISORY BOARD.

In May of 1905 I did what I had been contemplating doing for upwards of a year, to wit: appointed an Advisory Board of leading citizens, consisting of Hon. William Potter, John H. Converse, Esq., W. W. Justice, Esq., Rudolph Blankenburg, Esq., William T. Tilden, Esq., Francis B. Reeves, Esq., Mahlon N. Kline, Esq., Hon. Charles Emory Smith, John H. Michener, Esq., Morris M. Newburger, Esq., Hugh McCaffrey, Esq., Charles H. Harding, Esq., Walter F. Hagar, Esq., and Dr. John H. Musser, for the purpose of getting their advice and the benefit of their judgment upon the various municipal problems as they should arise. This advisory board has met once a week ever since their appointment and in the most self-sacrificing spirit have given all their time necessary to consider the interests of the city. They have discussed with me all the important municipal problems that have arisen and I have been enabled to get the benefit of their wide experience and their sound judgment on all these subjects.

BURHOLME PARK.

There was conveyed to the City of Philadelphia during the year a mansion house and surrounding property of about forty acres known as Burholme Park. This property was left to the City to be used as a public park and the mansion house as a museum and library, by the will

of the late John W. Ryers, but this was not to take effect until after the widow's death. His widow, however, determined to convey the property to the City at the present time without waiting for the gift to become operative under the will. It has been turned over to the Commissioners of Fairmount Park and I believe they already have it opened to the public as a park; or, if not they will have it opened during the summer of 1906.

DEPARTMENT OF PUBLIC WORKS.

It was necessary for the good of the service of the City on May 23, 1905, to make a change in the Directorship of this Department by removing Peter E. Costello, Esq., the former Director, and appointing A. Lincoln Acker, Esq., Director.

The amount expended during the year amounted to \$7,481,204.82, of which \$4,073,850.35 is chargeable to operation and maintenance and \$3,407,354.47 to extensions and improvements. The receipts for 1905 from this department were \$184,506.26 in excess of the receipts for 1904, and the current expenses for 1905 were \$495,780.06 less than in 1904. The total number of employees for 1905 was seventy-nine less than in 1904. These changes took place after the institution of the new Director on May 23.

I call your special attention to the splendid tables prepared by the Department, which will show the various items received and expended in each bureau of the Department.

City Ice Boats.

The winter of 1904-1905 was one of the most severe winters ever experienced in this City. The rivers were filled with ice, so much so that it was exceedingly difficult

for the three ice boats that we had in commission to keep the channel open. On February 5, 1905, Ice Boat No. 3 was sunk at the Delaware Breakwater by drifting on the sunken wreck of the Coal Barge "Santiago." Immediately after this loss the Bureau made arrangements with the Philadelphia & Reading Railway Company for the use of their Ocean Tug 'International' at the cost of \$100 a day. There was great difficulty in keeping the river open until the breaking up of winter about the middle of March. Early in the year the Department arranged with Messrs. Melville & MacAlpine, Naval Architects, to prepare plans and specifications for a new Ice Boat, the general design of which contemplated a vessel 232 feet over all, 45 feet beam, 22 feet depth of hold, with 13 feet draft, equipped with three triple expansion engines of 1200 H. P. each, and three propeller wheels—two aft and one forward.

On April 18, 1905, bids were opened, and subsequently, in accordance with the resolution of your Honorable Bodies, the contract was awarded to the William Cramp & Sons Ship and Engine Building Company for the new Ice Boat at the cost of \$350,000. The boat was launched December 28, 1905, and is expected to be the most powerful ice-breaker ever constructed in this country. The Trades Bodies were very anxious to have two boats of this type built, but inasmuch as the building of a boat of this type was very much of an experiment, I believed that it would be much better to build one and try that first, before we undertook to build the second one.

There is very little doubt that two of such boats would do very much more effective work than three of the old type. It looks, however, as though there would be very little opportunity to test its ability to break ice this winter as we have had no severe weather at all thus far and no ice in the river.

Bureau of Highways.

The expenditures of this Bureau for the year were \$1,587,760.50, of which \$975,680.10 were for extensions, and balance for current expenses. The receipts were \$225,213.20, an increase of \$12,649.89 over those of 1904.

I should very much like to see the amount appropriated, from year to year, for extensions increased; instead of increasing it has been going down for several years.

Last year, as will be seen by the report of the Bureau of Highways, there were twenty-one miles of new streets opened and graded, and over twenty miles of streets paved. Five and one-half miles of streets were repaved with improved pavements to replace old cobble and rubble pavements. I wish we could get rid of all the cobble and rubble pavements in the City at once, although it would probably take about \$3,000,000 to do it. Four and one-half miles of new macadam roads were built, and over 122,000 square yards of re-surfacing were completed. In awarding the contract for repairs to macadamized roads for 1906, it has been determined to so change the specifications that the contractor for the lump sum contract price will be required to furnish, deliver, spread and roll at least 60,000 tons of broken stone, and additional stone required over and above this amount is to be supplied at the rate of \$1.75 per ton delivered, spread and rolled. Under these conditions it is believed that the work on roads of this class will be more satisfactory than in the past.

The contract for repairs to paved streets for the year 1905, was let for the sum of \$127,000. Under the contract, the streets should all have been in repair by June 1st. At the time the contractors were changed, a few days before June 1st, it was found that little or no work had been done under the contract, and the contractor was immediately notified that unless he put on a sufficient force to put

the streets in good condition at the earliest possible moment, the contracts would be cancelled. This had the desired effect, and while the streets were never in first-class condition during the year, they were certainly put in very much better shape than they would otherwise have been.

The general repairs to bridges have been carried along during the year; a number of new bridges have been built, and a number of old ones repaired. As will be seen by the report of the Bureau of Highways there are over three hundred bridges in the City under the care of the Bureau of Highways. The reason of this is that there are so many bridges carrying streets over railroads that the City has been compelled to maintain, although the injury to such bridges in most instances is occasioned entirely by the effect of the smoke from the locomotives. The Director calls attention to the necessity for increased appropriations for keeping in repair the whole of these bridges.

You will notice that the Director also calls attention to the necessity for resurfacing a great many of the asphalt streets that will cost approximately \$400,000. He also calls attention to the condition of the streets upon which the Passenger Railway Companies have their tracks, and I heartily agree with him that in cases where the Passenger Railway Companies refuse to comply with notice from the Bureau of Highways to make repairs that the Department should make the repairs immediately, and have suits brought against the Companies to recover the amount thus paid. We are protecting them in every way possible by insisting on any other corporations desiring to open the street giving a bond to repair the same and keep it in repair for five years, so at the present time there can be no injury to the Street Railway Companies by other Companies being permitted to open the street to lay conduits, or other sub-contractors.

The City is badly off in regard to the transportation of passengers over the streets of the City, inasmuch as the companies hold perpetual franchises, and I cannot believe that we shall be able to give a full measure of benefits to our citizens until we can have some competition with the present system of street railways. I am glad to say that it looks at the present time as though we were likely to have it.

I also call your special attention to the report of the Director, under the head of the Bureau of Highways, in which he calls attention to the ordinance authorizing the Keystone Telephone Company to lay underground conduits, and that their liability ceases at the end of twenty days after the repaving is done unless the Department has filed a protest against the character of the repaving before the expiration of twenty days. Of course, no one can tell whether it is properly repaved within twenty days. It is therefore necessary for the Bureau of Highways to file protests in every case; but this provision of the ordinance is entirely absurd, and I would suggest that an ordinance be introduced for the purpose of repealing this section of the Keystone Ordinance. They should be compelled to repave and keep the same in repair for a period of five years in any event.

I call your attention to the increase in cost of gasoline lighting. You will notice by the report of the Director of Public Works that for 13,034 lamps in 1903, the cost of lighting was \$315,650.35, and for 12,870 lamps in 1904, the cost was \$355,798.79, and for 13,454 lamps in 1905, the cost was \$386,377.40. Your Honorable Bodies, however, have appropriated sufficient money for 1906 to buy the posts upon which the gasoline lamps are erected, so that the City will own the posts and can have some kind of competition during the coming years.

I am glad to be able to report to you that during the year the last toll gate within the limits of the City of Philadelphia was abolished. The Philadelphia Rapid Transit Company, by virtue of an agreement that they had with the City, abolished the toll gates on Old York road within the limits of the City and satisfied an award that had been made to them, or rather to the underlying company of which they were the lessees, of \$20,000 without the payment of any portion thereof by the City, so that this highway is now free and in the custody of the City.

Street Cleaning.

The work done by this Bureau has been satisfactory. The details shown by the report of the Chief of the Bureau will prove very interesting reading. We have been endeavoring to reduce the cost of street cleaning and for the collection of garbage for some time, and not until the middle of 1905, did it seem possible for us to get any lower bids. When we advertised for the collection of garbage for 1906, bids were opened about May 1, and a new bidder came into the market with a bid of \$444,000, which was \$116,000 less than the bids for 1905. Even with this saving the price was deemed excessive. Bids were rejected, and readvertised. On July 13, 1905, bids were again opened; three bids were submitted and the Penn Reduction Company was awarded the contract, they being the lowest bidders, at 399,575, which was \$160,425 less than the price paid for 1905. We adopted the same plan in regard to street cleaning; when bids were first opened the lowest price for the entire City by districts was \$917,485, and although this was \$32,515 less than 1905, the bids were rejected and advertised again, and the lowest bid this time to clean the entire City by districts was \$844,272, or \$105,728 less than we paid in 1905, so that we have this fact that al-

though the City increased by over 10,000 new buildings and the addition of fifteen miles of streets, the department saves \$266,153 in cleaning the streets and removing the garbage, in comparison with the cost for 1905.

Bureau of Surveys.

This most important of all the City bureaus has had an exceedingly busy year under the able direction of its excellent Chief Engineer, George S. Webster, Esq., and I call your special attention to the Chief Engineer's report of the work accomplished by his bureau during the present year. He calls attention to the fact that the Commission appointed to fix the boundary line between Philadelphia and Delaware Counties has made its final report, which has been finally approved by the Courts of Quarter Sessions of Delaware County and of Philadelphia County.

During the year nearly twenty miles of branch sewers were constructed; 4 1/2 miles of main sewers, and 8 1/2 miles of sewers were built at private expense, and the total length of all sewers in the City on December 31, 1905, was a little over 1,041 miles.

Grade Crossings.

The negotiations which have been conducted between the City and the Railroad Companies for the abolition of grade crossings along Ninth street, between Spring Garden street and Hunting Park avenue, 3 1/2 miles with 30 grade crossings; along the Richmond Branch of the Philadelphia & Reading Railway, between Somerset and Richmond street, 1 1/4 miles with 2 grade crossings, and several new streets to be opened, and along the Philadelphia and Trenton Railroad on Trenton avenue, between Norris and Butler street, 2 1/2 miles with 33 grade crossings, has progressed very favorably; and there is now reasonable

hope that very much will be accomplished during the present year. This work alone will abolish 65 grade crossings and open a number of new streets under the elevated railroads.

We also arranged for the payment by the Philadelphia Rapid Transit Company of \$400,000 as a contribution toward the City's half of this expense, as it will be of very material assistance to them to have these grade crossings abolished as well as a saving of considerable expense.

The building of the Market street Subway has been exceedingly disappointing; the whole project was to be done in three years. The Rapid Transit Company, instead of having two contractors,—one working on Market street east of the City Hall, and one on Market street west of the City Hall—had only one working west of the City Hall, and it has taken them nearly three years to complete that part of the Subway. They have now asked for three years additional time to build the Subway east of the City Hall, and the provision for the payment of \$400,000 for the abolition of grade crossings has been included in that ordinance. I say that the work has been disappointing because, had there been the proper expedition used, the whole Subway could now be completed and operated and thus have relieved the tremendous congestion on the surface of Market street.

Several plans have been prepared for the Parkway between Logan Square and Fairmount Park, but all of them have been rejected until one was drawn by the Bureau of Surveys a few months ago, which provided for the Parkway leaving Logan Square on the northwest corner and connecting with and taking in Pennsylvania avenue, which will make the Parkway very wide at the Fairmount Park end, and will keep the Washington Monument in a direct line with City Hall Tower. I trust this work will go on

rapidly so that we shall start to build the Parkway this summer and perhaps finish that section of it before the end of 1906.

Bureau of Water.

This bureau has expended during the year \$1,746,025.71; the sum of \$1,945,000 was for current expenses, and the sum of \$800,000 was for extensions and improvements.

I call your attention to the Director's report on the Bureau of Water, giving many interesting details. It will require some improvements and extensions in the pumping machinery in order to meet the growing needs of the City, and it is my purpose some time during the present year to have a thorough investigation made of the needs of the Bureau so that we can furnish everyone with an abundant supply of water; and when the filtration plant is completed we shall be able to furnish pure water as well as furnish it in abundant quantity; but, we shall want larger appropriations for pipes and machinery than we have had in the past. During the year 1905, there was laid by this Department 159,307 feet of surface mains, upwards of 47,000 feet in excess of that laid in 1904. The total quantity of pipe now in service is about 1,500 miles. There are over 14,000 fire hydrants throughout the City.

Bureau of Filtration.

Since the filtration plant was started there has been appropriated to date \$22,500,000 from loans and direct taxation. Of this sum there has been charged off on account of contracts to date \$21,745,127.21, leaving an available balance on December 31, of \$754,872.79. On June 15, 1905, Mr. John W. Hill, Chief of the Bureau,

resigned, and Mr. George S. Webster, Chief of the Bureau of Surveys, was placed in charge of the Bureau as Acting Chief, and he looked after this Department in addition to the services that he performed as Chief Engineer of the Bureau of Surveys. In view of the work that he has done, and the increase in the work and the responsibility of the Bureau of Surveys, and the fact that Chief Webster is one of the most efficient men for the position, I would suggest that his salary be increased either \$1,000 or \$2,000 per annum. It is but fair to me to say that Chief Webster has never asked for this increase, but it seems to me that the Executive Officers of the Municipality should recognize a man's ability and compensate him accordingly and not wait until some large corporation comes along and secures him at a higher salary away from the administration.

Shortly after the resignation of Mr. Hill, we received a quantity of information which caused us to make an investigation of the Bureau of Filtration, and finally to appoint The New York Audit Company to go over the accounts of the Bureau and to secure a Board of Expert Engineers to investigate the construction of the filtration plant. We were fortunate in securing Major Cassius E. Gillette, of the United States Army, William Barclay Parsons, Esq., and Donald MacLennan, Esq. Mr. Parsons only took the appointment subject to demands upon him by the U. S. Government, as he was one of the Commissioners of Engineers on the Panama Canal, and he found that his entire time was so taken up with this work that he was not able to give much time to our filtration plant, although he made a personal investigation of the Torresdale Conduit. The Board of Engineers have been engaged in making an exhaustive examination of the operations of the Bureau, analyzing the various contracts and studying the methods by which the work of the Bureau has been conducted.

And their preliminary report was submitted to your Honorable Bodies on the 2nd day of November, 1905. The result of this investigation will probably make it necessary to annul a number of the contracts and push along the filtration system as rapidly as possible. I was fortunate in securing the services of former Judge, James Gay Gordon, to assist me in the various legal problems that have confronted me during the past year and his legal ability and acumen that he has devoted to the cause of good government has been of immense benefit to the City during the whole of the year since May 23rd.

During the year 1905, a number of changes took place in the Department of Public Works in addition to the change in the Director. The Assistant Director, William H. Baker, resigned and was succeeded by Thomas L. Hicks, Esq.; William H. Brooks resigned on June 6, as Chief of the Bureau of Highways, and Frank E. Smith was appointed Acting Chief. On July 7, William E. Maher was appointed Acting Chief on temporary duty and resigned July 28, 1905. He was succeeded by Jerry A. Hunter, who was appointed Chief of the Bureau of Highways on August 7, 1905, he being the only one who passed the Civil Service examination. Samuel Sutcliffe, Chief of the Bureau of Street Cleaning, resigned October 19, 1905, and William C. Felton was appointed Acting Chief on temporary duty October 20, 1905.

Since May 27, 1905, a number of changes have been made in the methods of conducting these bureaus. The policy of awarding contracts without favor to the lowest responsible bidder has been rigidly adhered to; competition has been encouraged in every possible way and contractors given to understand that all work must be satisfactorily performed for the City. Specifications for the several classes of work in the various bureaus have been studied

with a view of revising them so that their full purpose and intent shall be clearly expressed and thoroughly understood by every bidder and to have as few items as possible and thus avoid confusion and misunderstanding.

Pursuant to the policy inaugurated in June, 1905, the Director of Public Works points out that this policy has resulted in some economies in his Department as follows:

On account of salaries, wages and horse keep,	\$139,282.10
Gasoline lighting	13,454.00
Street cleaning	105,728.00
Removal of garbage	160,425.00
Sand for filtration	346,786.00

Total	<u>\$765,675.10</u>
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The saving in the first item is by a reduction in the number of employees in the service as compared with the year 1904. The saving in the second, third and fourth items being reductions in contract prices for 1906, as compared with the cost of the work in 1905. The reduction in the last item was brought about by the annulment of Contract No. 50 for filtering materials, and re-advertising for the amount of material required to complete the contract.

The Director devotes two pages to the Passenger Railway streets. I have already, under the head of Highways, called attention to the conflict between the Rapid Transit Company's obligation to keep the streets in repair and the other corporations that tore them up for the purpose of putting in underground structures, and have also called attention to the fact that by our permits we compel the corporation desiring to tear up a street to repave it and keep it in repair for five years, so that the Rapid Transit Company cannot complain of this. But another important matter that the Director calls attention to is the fact that there are to-day in Philadelphia some sixty streets, parts of which are occupied by the tracks and electrical construction of the Passenger Railway Companies for a

distance, in the aggregate, of 186 blocks, or about 16 1/2 miles, over which there is not run a single car for the accommodation of the travelling public. Further, that there are 19 streets occupied for a distance of about 32 blocks with the conduits of the Passenger Railway Companies, upon which no tracks are laid, in all nearly 20 miles of public highways occupied by these companies for which no public service is rendered to the travelling public. He further calls attention to the fact that two of these streets have never been repaved with improved pavements and quite a number of them which have been repaved are in bad condition for want of proper repairs. The Director calls attention to the clauses of an ordinance showing the responsibility of the Railway Company to keep these streets in repair. I shall instruct the Director of Public Works to notify the Rapid Transit Company to take up the tracks on the streets that are not being used and to repair the streets so that the public can again have the use of them, or else to run cars on the streets and give the public the advantage of this service.

DEPARTMENT OF PUBLIC SAFETY.

In this Department, as in the Department of Public Works, it was necessary for the good of the service to change Directors and on the 23rd of May, 1905, I succeeded in inducing Colonel Sheldon Potter to accept the Directorship of this Department, and I call special attention to his very interesting report, especially calling attention to the following:

“Since that time, May 23, 1905, re-organization has proceeded; incompetent employees have given place to those of ability; the pay-rolls have been

purged of all persons holding sinecures; systems of bookkeeping and check systems of vouchers have been introduced; methods of inspecting all work done have been instituted; schedules so improved as to encourage competitive bidding and many other reforms inaugurated which have been productive of marked improvements and satisfactory results.”

There has surely been a very marked change for the better in this Department, and more especially so in the Bureau of Police, and I call your special attention to the Director's very modest report as to the accomplishment of this Bureau during the last seven months of the year. Perhaps the most important work of all was the purging of the assessors' list, which resulted in striking off 75,000 names that were improperly thereon. Considerable criticism was made of this work because it was alleged that it was more political work than police work; but, surely, no one will hesitate to admit that any work that is necessary to prevent crime is essentially police work, and anything that the police bureau could do to prevent the voting of any number of the 75,000 names that were improperly on the list was a great step in the direction of preventing crime, and certainly the result has well justified all the work that was done by the Bureau of Police in this regard.

I call your attention also to the report of the Director of the additional work done by the Bureau of Police, making 80,855 arrests during the year, an increase of 7,794 over the previous year; also, the work that was done in guarding upwards of 12,000 houses that were vacant during the summer, only 24 of which were entered and robbed, and the goods valued at a little over \$6,000 of which one-half was recovered, and 22 thieves were arrested. His report also sets forth that property to the value of

\$363,324.64 was recovered, which was an increase of upwards of \$100,000 over the value of property recovered during the preceding year; \$145,000 of this amount was recovered by the detective division. The work of the Special Officers of the various districts has been improved by detailing half of them each month to Detective Headquarters as acting detectives.

The Director endorses the recommendation of the Superintendent of Police for the completion of the patrol service by the installation of crews and wagons in the Fifth and Eighth Districts. The Director also calls attention to the very efficient work by the mounted detail of policemen acting as a traffic squad in the centre of the City during the Christmas holidays.

The Director urges very strongly the increase of the Police Force. He says:

“I cannot too strongly urge the increase of the police force. It is expected to cover and protect 129 square miles of territory. The patrolmen, exclusive of the reserves, who are stationed upon posts, and harbor police who are upon the boats, number only 2,212 men, or about seventeen per square mile. If this number is reduced by the sick and specially detailed men, the effective force for patrolling the City streets is not above fifteen men per square mile, only half of whom are upon the streets at one time.

“In the eleven suburban districts in which the mounted men are distributed, the force averages only about six men per square mile without allowances for sick, disabled and specially detailed; that is to say, with the full force in operation there would be only three men to cover a square mile at one “out.” In one of the larger districts, covering two wards, with a population of about 80,000, the average of

patrolmen per square mile is only about five, and with deductions for sick and disabled and those absent from duty or specially detailed, the force in this district would not permit of more than two men on duty per square mile at one "out." The average throughout the City is much less than that of any large City in the United States. The force should be increased at least two hundred men. This should not be done immediately, as better results are obtained by a gradual appointment, which will enable the force to assimilate the new material added to it and to bring that material up to the state of efficiency required for good work; but one hundred men could profitably and should be immediately added to the force. By increasing the number of mounted men and by the use of motor cycles where the roads will permit, a number of contiguous beats patrolled by footmen can also be covered by one mounted man working through such contiguous beats, and thus doubling the effective force on those beats."

The Director also recommends the purchase of thirty motor cycles, and the abolition of the bicycle for police purposes. He says with the introduction of the automobile the bicycle has become useless, and that the motor cycles which have a maximum speed of from forty to forty-five miles an hour can easily overtake automobiles, can regulate the traffic on more extended beats than the bicycle and would double the efficiency of the present bicycle squad. He recommends the purchase of thirty of these machines which can be obtained at the price of five thousand dollars.

He also recommends a change in the present method of advancing sub-policemen to the office of patrolmen, and calls attention to the injustice of the present method, as follows:

“When vacancies occur in a particular district the first sub upon the list is advanced to the office of patrolman. Some receive very rapid advancement, others remain subs for many years before a vacancy occurs in their district. This is an unreasonable method. It is disheartening to the subs of one district to see men who have entered the bureau sometimes years after them, advanced to the position of patrolman while years of labor in other districts meet with no such reward. It would cost no more to the City of Philadelphia if instead of the appointment of sub-patrolmen, patrolmen were taken on at the present wage of a sub-patrolman, namely, one dollar and seventy-five cents, and the daily wages were advanced each year at the rate of twenty-five cents per year until such wages reached two dollars and seventy-five cents per day, which is the present maximum pay of the patrolman. This constantly increasing compensation would be an incentive to faithful service and would foster the desire to remain on the force until full wages were being earned.”

He also recommends the adding to the detective force of a photographer of the rank of sergeant, at a salary of sixteen hundred dollars, so as to formally adopt the Bertillon system of identifying criminals. This has never been formally adopted although the superintendent of police caused one of the patrolmen to be instructed in the work and he now photographs the criminals and records the results of measurements and the characteristics of the criminal for identification. The Director also urges the advance of the assistant to the superintendent of police to the rank and pay of a lieutenant on account of the services required of him. He also suggests the appointment of an attorney for the police bureau for the purpose of

arranging the evidence and attending the hearings. The Director has had detailed to this work for several months past one of the employees of the department who was a member of the bar, but his time will be occupied fully with the other duties of the office so that it will be necessary to make a permanent position of the attorney of the Bureau of Police.

I call your attention to the Director's report on the work of the Fire Marshal's Bureau and especially that part of it in which he refers to the fire escapes of the city. He says as follows:

"There are nearly 4,500 fire escapes in the City. This Bureau is composed entirely of men who have so many duties connected with the offices they occupy as to make it impossible for them to inspect fire escapes after they have once been erected or to ascertain where they are needed. The Bureau may well be likened to a skeleton regiment, officered but having no enlisted men. About three years ago the entire force of elevator inspectors was detailed to inspect fire escapes, with the result that no inspection of elevators was attempted until the spring of 1905, and men who were receiving \$1,200 a year were doing work which others perfectly competent could have been procured to do for less money. During that time the City was well covered and the buildings upon which fire escapes should have been erected were quite fully ascertained. Since then the question of fire escapes on new buildings has been cared for by the Bureau of Building Inspection. There should be inspectors whose frequent inspections of fire escapes when erected will insure their preservation in good condition. How many of these are required I am not at this time prepared to say. But I shall detail

from the police force such number of men as may be necessary and shall report upon this matter at a later date.

“A recent investigation of fire escapes made throughout the City by the bureau of police shows a most flagrant disregard of the law in the obstruction of the fire escapes, and has also brought to light a lack of attention to their maintenance. Many have become insecure by corrosion for want of proper care. Frequent inspections would prevent this.”

I also call your attention to his report of the work done by the Chief Surgeon of the department, Dr. William M. Angney and the additional duties imposed upon him by the reorganization of the department and his recommendation that his salary should be increased to not less than \$2,500. I most heartily approve of this, as I have had in mind for sometime such a recommendation as the work that he does is exceedingly important and now that additional labors have been put on him this increase should not be delayed.

I also call your attention to the Director's report on the school of instruction that he has planned for members of the Bureau of Police, as to which he says:

“I have planned the formation of a school of instruction for the new members of the police bureau and for such of the older members and officers as would be benefited by attendance at such school. The instruction will cover drill, setting-up exercises, the police manual, work of the special, school of the trooper for mounted men and mounted drill. For patrol crews, new men and street sergeants there will be instruction in first aid to the wounded. The utility of such instruction will be seen when it is considered that over thirteen thousand sick and

wounded persons were handled by patrol crews during the year. New police stations are badly needed in the Eighth and Fourth Districts, where the stations are old and unsanitary and entirely unsuited for the accommodation of the men. The condition of the plumbing in many of the station houses is very bad and the facilities for cleanliness are inadequate. Some houses have but a single bath tub (and that of the antiquated metal lined type) for the accommodation of from sixty to seventy-five men. Bath tubs should be abolished and shower baths of modern construction installed in all fire and police houses."

The Director also calls my attention to the Police Pension Fund and has sent me the following communication in connection therewith:

"The permanent Police Pension Fund, as authorized by the Bullitt Bill, amounted on the first day of January, 1905, to \$200,000. The interest upon the investments during the year 1905 amounted to \$7,308, or somewhat less than four per cent. This was exclusive of bank interest upon all funds whether permanent or not. The pensions paid during 1905 amounted to \$132,936.53. This amount was made up of the appropriation by City Councils, the dues of officers and pensioners, the interest on investments and bank deposits, and the sum of \$33,389.25 transferred from the Reserve Fund. This Reserve Fund was made up of the receipts at base ball games and from excursions and the discount on securities purchased, of which the first item contributed \$53,549.79, and the second \$764.40. It therefore appears that \$33,389.25 transferred to income was the result of the efforts of the men themselves outside of any contribution of dues. There are to-day a considerable

number of men on the force who from age, injury or other disability are unable to perform proper police duty. Many of these men are eligible to the pension list; certainly all the aged ones are; but with so large an amount of the necessary moneys to pay pensions dependent entirely upon the support which the public may choose to give by purchasing tickets for baseball games, excursions and benefits, I hesitate to deprive these aged persons of a livelihood so long as I can find any work that they can do upon the force. The Pension Fund of the Bureau of Fire yields a slightly larger rate of interest, but it also is dependent upon money received from benefits."

"The appropriations made by Councils out of the public funds to these worthy public servants, many of whom have been incapacitated by injuries received in the performance of duty, does not nearly meet the need. There should be a retiring age for men in the Police and Fire Departments. There are quite a number of policemen who have reached the age of three score years and ten. Certainly the public cannot expect that exhibition of strength and prowess in the performance of police duty which is to be expected and is exacted from younger men. It is hard to conceive of any police duty that a man of seventy is fitted to perform. There are a number of others whose injuries received in the service appeal to us, and who with advancing age become more and more incapacitated for their work. Increasing weight with advancing years, and decreasing muscular power to bear that weight, is the source of a great deal of incapacity. I have recently received a number of doctors' certificates stating that certain men were unable because of their size or defects to take the light

gymnastic exercises that are so necessary to keep men in good physical and active condition. Can it be conceived that a man who is unfitted to take any of the light gymnastic exercises, where no apparatus whatever is used, simply the motion of the limbs, is fitted to do any kind of police service whatsoever?"

"The difficulty is a practical one. The choice is either to throw men who have been long upon the force out of work and upon a Pension Fund which is inadequate, unless supplemented by benefits depending upon the charity of the public, or their love of sport, or to keep these samemen upon the force, incapacitated though they be, to do any work. The City of New York, and probably other cities, have solved this question in a manner which seems to be satisfactory and to give good results. At the end of a year all balances remaining of the sum appropriated for the payment of the police do not merge, but are transferred to the Pension Fund. I am not prepared at this time to go that far in my recommendation, but I am prepared to advise and strenuously to urge that the fines and penalties of both the Police and Fire Departments be paid over to the Pension Fund. In most cases the officers are not under suspension and have given the City service. The fines are withheld from their pay and go back again into the City Treasury. The City would be at small loss, as it has generally received nearly the full service. Combining with this there should be a retiring age, not exceeding sixty-five years, and it would probably be better were the age fixed at sixty or sixty-two years. With so small a force as is maintained by the City it is of the greatest importance to the public that it should be composed of entirely effective men."

Bureau of Fire

The Director's report of the work of this Bureau during the year shows that over 3,600 alarms were responded to. There were 3,410 actual fires, ten less than in 1904. The losses by fire during the year amounted to \$1,636,877 as against \$1,640,198 in 1904. The Bureau has been greatly assisted by the operation of the high-pressure system covering the district between Delaware avenue and Broad street and Race and Walnut streets. The Director reports that this service has been very satisfactory. During the year the plant was thoroughly tested by a committee of expert engineers appointed by the National Board of Fire Underwriters. The test lasted over four hours under a pressure of 250 pounds and during the entire test not one defect was developed in engines, pumps or pipe line service. There is no doubt at all but that the present system should be extended with a view to final completion. The Director reports that it would cost about \$150,000 to complete the system, or if so much money could not be appropriated the cost of laying mains in any of the lateral streets included within the system would be \$8,500, so that the work might be done progressively. A number of these streets being equipped each year. I call your attention to the reason set forth by the Director in his report for the adoption of this system to complete the work. The Director also calls attention to the advantages of improving the fire service in other parts of the City and the desirability of preserving the remaining reservoir at Seventh and Lehigh avenue and establishing a high pressure plant for the mill districts in Kensington and Richmond. This matter should be looked into carefully and perhaps it would be unwise to destroy the reservoir at the present time or permit it to be used for any other purpose, until it can be determined whether the suggestion of the Director is feasible.

The Director calls attention to the fact that Chief Baxter recommends the establishment of a number of additional fire engine companies, three of which are urgently needed, one in the neighborhood of Sixth and Erie avenue, one in the Twenty-fourth Ward and the third in the Thirty-ninth Ward, and also suggests that the company at Branchtown, in the Forty-second Ward, which is equipped with a combination wagon should be increased with a full company equipped with an engine. The Thirty-ninth Ward has already a suitable lot and the Director urges that a building be erected there during this year.

Electrical Bureau.

The Director calls attention to the fact that with the close of 1905 the Electrical Bureau rounds out the fiftieth year of its existence. I call your special attention to the details of this report, and especially to that part of it which calls attention to the fact that this Bureau removed seventy poles and fifty miles of overhead wire; instead of there being a decrease in overhead wire there was an increase of both poles and overhead wires throughout the City, the report showing that there are now 20,148 miles of overhead wire which is an increase of over 2,700 miles over 1904, and that there are upwards of 71,000 poles, an increase of over 1,900 since 1904. I think the time is coming when the City will have to insist upon all overhead wires being placed underground, and I wish the corporations maintaining at the present time overhead wires would take warning that they may be called upon at any moment to remove their overhead wires, so that they might start at once to do it, and thus do it gradually and not to have cause of complaint if your Honorable Bodies should pass an ordinance requiring all overhead wires to be placed underground within three months after the

passage of such an ordinance. The Director calls attention to the fact that there are 10,968 electric lights on the public highways and that included in this there are underground City cables 823, Girard Estate cables 70, making 893 of the City's and only 456 of the electric light cables. We have not been at all satisfied with the price that the City has been compelled to pay to the electric light monopoly of Philadelphia. Up to and including 1905 we have been paying \$110 per light per annum for electric arc lights and this was not reduced until there was agitation over a competitor coming in here and bidding; and after this agitation when the city asked for bids for 1906 the price was reduced from \$110 per light to a little over \$99 per light. In the meantime, however, some New York capitalists made a suggestion to the city for the building of an electric light plant and the establishment of an absolutely underground system of electric lighting and furnishing electric lights to the city at not over \$85 per light and paying to the city five per cent of their gross receipts. I trust that we shall be able in a very short time, in a separate message, to send to your Honorable Bodies a full report of our negotiations with these gentlemen and to recommend to your Honorable Bodies the passage of such an ordinance that will give the people of the city the advantage of competition, as there is no doubt, from the reports that I have received from other cities, as to what they are paying whether to private companies or for the maintenance of municipal plants (which cost very much less than the amounts paid to private corporations) that they pay very much less for their lighting than this city is paying at the present time.

Another effect of the agitation over the electric lights and the possibility of competitors coming in, has been the reduction to the private consumer in many parts of the

City. But I am strongly of the opinion that we should do everything that we can to get competition here, because if we should fail in getting it I am fearful that the monopoly will go back to its old prices as soon as the agitation over competition has ceased.

We should consider the establishing of a municipal plant, which I should most heartily favor if we do not succeed in getting a competitive plant established by a private corporation.

Bureau of City Property.

I give you, in the Director's own words, the condition of this Bureau, when the present Director took charge of the Department:

"This Bureau was in a state of utter demoralization and disorganization when I came into office. It kept neither books nor records, nor had it any system of vouchers, nor any method of determining whether work which had been ordered done in the various properties under its care was done; its schedules were so arranged so that no one but favored bidders could obtain awards; its shops in the basement were in receipt of large quantities of supplies of which no account was being kept and the disposition of which was not shown in any records; its labor rolls were padded with the names of many persons who did no work for the City of Philadelphia. The real estate in its charge, specially the fire and police houses, were many of them in a position of decay. One station house at least had not been painted for 14 years. Water closets were out of condition and had been for many months; squares were neglected; in some of them the superintendents and assistants appearing at long intervals; fountains in the squares

had been robbed of the pipes that fed them; urns broken down; trees destroyed and the grass overrun. An utter lack of anything like system was the distinguishing characteristic of the Bureau of City Property. Absolutely no account was kept of the large amount of rents received from wharves and other properties and the superintendent of wharves admitted that he could not tell from any data what he had received or how much had been turned over. It was therefore, necessary, to thoroughly reorganize the staff of employees in that bureau, and to part with the services of many who were incompetent. The Bureau has now been fully organized and is being operated along business lines, with records carefully kept and with careful supervision of the labor being done, and with an economy to which it had been a stranger for many years."

The Director calls attention to the fact that the report of Chief Eisenhower shows an increase in receipts and a decrease in expenditures from 1904. The report of this Bureau shows that the bath houses were patronized by 4,602,729 bathers and Chief Eisenhower recommends that they be fitted up for winter bathing as they are at present idle about half the year. Before this is undertaken, however, I should like to ascertain the expense of it, as of course it would require apparatus for warming the water and heating the rooms.

The Director also calls attention to the fact that he wants eleven more laborers provided for in this Bureau, that he had 25 last year and this year they were reduced to 14, but that he understands this decrease occurred through an error. He also recommends that the carpenter force should be increased by two.

Bureau of Building Inspection.

The Director starts his report on this Bureau in the following language:

“This Bureau has been remodeled along entirely different lines from those in which it was moving. Its chief characteristic was the number of exceptions that were made to the application of the laws relating to building in the City of Philadelphia. The law was constantly violated and yet there were complaints from many contractors that while others could violate the law they were compelled to submit to its provisions. After a conference with a committee of the Builders' Exchange and with many other builders and structural engineers, I reorganized the Bureau by the appointment of a larger number of engineers than had theretofore been connected with it. The districts were also re-arranged so that there was committed to the inspectors a class of work with which they were competent to deal. Those sections of the city where structural work predominated were committed to structural engineers. A selection of chief of the bureau and of assistant chief of the bureau was made from among the engineers of the bureau.”

He also recommends some increase in the office force during 1906. There was an increase in the value of building operations of 20% over 1904, and of 67% over 1900. During 1905 there were 16,958 building operations, with an estimated value of over \$34,000,000. Included in this amount were permits for 9,420 dwellings, and I call your attention to the details of this report which you will find in the Director's report to me.

Bureau of Boiler Inspection.

The important suggestion in the report of this Bureau by the Director is that the Bureau should make an examination of all boilers in the City, and thus reduce the possibility of accident. It appears that the present system is to issue a certificate by the bureau on the policy of an insurance company whose inspection is made to take the place of an inspection by the Bureau. And this the Director condemns and suggests that the examination should be made by the Bureau itself.

The Director reports that this Bureau, under the smoke ordinance made seventeen hundred and sixty inspections, abated 163 nuisances by the introduction of smoke consuming devices in 71 manufacturing establishments, by the substitution of hard for soft coal in 92 establishments. A number of other cases have been referred to the City Solicitor and actions have been brought by him, decisions in which have been appealed from, so that the validity of the ordinance is in question and the City Solicitor has suggested that it would be unwise to commence further prosecutions until there is a final decision on the validity of the ordinance.

I am very much disappointed that we have not been more successful in abating the smoke nuisance and we should surely try to get an ordinance that will be effective. I believe that if all the manufacturing establishments would work with the City authorities on this matter and get into communication with the Department of Public Safety, that they could agree on plans, at a very small cost to themselves, to avoid the smoke nuisance, but the ordinance should be uniform so that every violator of it could be proceeded against without fear or favor, and I think we must all agree that there can be no entire stoppage of the great smoke nuisance now existing here

until the railroads shall very radically change either the coal they use or their system of firing, or it might be helped very materially if they would adopt electric motors for their local traffic. While we have no desire to put any unjust burden upon anyone, we have been trying for two years to abate the smoke nuisance and no one can now complain that they have not had sufficient warning that the City has determined to protect its citizens from this nuisance, and I would therefore recommend that, without waiting for a determination by the courts of the legality of the ordinance in dispute, that we have an ordinance drafted that there can be no doubt about and that it shall apply to everyone alike and have it put in operation so that this nuisance can be abated.

Bureau of Correction.

The report of the Superintendent of the House of Correction shows a daily average of 857 inmates as against 948 for 1904. I refer you to the very interesting detailed report of the number of inmates received and discharged during the year, and just who they were and how often they had been there before. They have a gas plant connected with this institution which netted during the year upwards of \$27,000. The superintendent states that the \$15,000 granted for an extension of the service pipes to Holmesburg will greatly increase the efficiency and earning capacity of the plant.

The Director of the Department of Public Safety calls attention to the fact that his Department is the only department which has not a chief clerk, that the chief clerk of the Department of Public Works receives a salary of \$1,800; the chief clerks of the Departments of Health and Supplies each receive a salary of \$2,500 and that a man who acts as chief clerk of the Department of Public

Safety and gives from 12 to 16 hours a day to its business, who frequently works seven days in the week and who has not even had a single days vacation during the present Director's term, receives the sum of \$1,200 a year. He says further that this acting chief clerk is expected to keep in touch with the affairs of the department, to be an encyclopaedia of knowledge respecting all appropriations, and the ways and means of running a great department of nearly five thousand employes.

I have advocated the equalization of salaries of City employees for some time and surely the time has now arrived when something of this kind should be done. By this I do not wish your Honorable Bodies to understand that I am advocating the advance of salaries all along the line in order to bring every one up to the highest salary that is paid for the same service. What I am advocating is equalization and I think in some instances the wages should be reduced instead of increased. And if your Honorable Bodies will authorize me to appoint a commission of three persons for the purpose of going over the various bureaus and departments of the City for the purpose of equalizing salaries, I will see that this is done and report to you so that the necessary equalization can be made in the appropriations for next year.

DEPARTMENT OF PUBLIC HEALTH & CHARITIES.

On October 23, 1905, I was very sorry to lose the services of Dr. Edward Martin, who had been Director of this Department for nearly two years. Mr. Harry A. Mackey, who had been appointed by Dr. Martin as Assistant Director, in place of George Sunderland, a few

days before Dr. Martin resigned, had charge of the Department for a month until I succeeded in securing the services of Dr. W. M. L. Coplin, the distinguished Pathologist, who took office on November 27, 1905.

Bureau of Health.

From the report of the Director I am happy to say to you that the death rate for the year just closed was only 17.25 per thousand population and is the lowest in the history of the City. It is rather interesting to know that while those dread scourges of childhood—diphtheria, membranous croup and scarlet fever—added to the other scourge that generally attacks older people—typhoid fever—the total of all deaths from these diseases only made five per cent. of the total number of deaths, while diseases of the lungs including the two all important causes—tuberculosis and pneumonia—were responsible for almost twenty-two per cent. This shows most conclusively that tuberculosis and pneumonia are the two diseases most to be dreaded, and those that we should pay most attention to.

The Director calls attention to the importance of educating the public by circulars, pamphlets and similar means, and the importance of proper cleansing and disinfection of houses in which deaths have occurred from tuberculosis, and he says that at present disinfection alone is possible. He also advocates the establishment of properly equipped dispensaries for the treatment and education of the poor, and adequate sanitarium care of all incipient cases during that stage of the disease in which recovery is possible; also, the employment of District Visiting Nurses to supervise the home care of properly selected patients, and hospital treatment for

advanced cases; and finally, sanitary supervision of those industries in which crowding and coincident infection of the healthy by the sick is prone to occur.

By proper care I am sure that the death rate from tuberculosis can be greatly reduced; physicians are now reporting to the Bureau of Health cases of tuberculosis that are being followed up by the Bureau and everything is being done that can be done to educate the people to the proper care of the patient to prevent contagion and to bring about recovery. I say that everything is being done that can be done; of course, I mean that can be done with the present appropriations to the Department. The Director suggests that there should be some additional appropriation to help the Department in carrying on this work.

While the death rate in the City has been greatly reduced and while the number of deaths from Typhoid is but a very small proportion of the total number of deaths, the number of cases of Typhoid are entirely too high, and we hope that with the completion of the Filtration system whereby we can get pure water, that we shall greatly reduce this disease.

One of the most gratifying things shown by the report of this Bureau after the reduction of the death rate is the progressively decreasing incidence of that dreaded scourge of childhood—Scarlet Fever. The Director calls attention to the fact that in the year 1903 there were 4,188 cases; in 1904 there were 3,740 cases and in 1905, 1,992 cases.

During the year just closed there were two cases of Smallpox reported neither of which originated in our City; this was as against 887 cases in 1904.

The great antidote for the other terrible scourge of childhood—Diphtheria—came into use, as you are aware,

only a few years ago, but it has had such a marked effect in decreasing the fatality of the disease that it has come to be used more and more, and the Chief of the Bureau of Health reports that during the year 1905, 6,000,000 more units of antitoxin were distributed than in the previous year. The Director reports that:

“The purchase of this all important remedial agent would necessarily require a sum far in excess of that needed for its manufacture, and as our present facilities are inferior and inadequate, it is highly important that larger and more modern quarters be provided. To this end I would strongly recommend the construction of laboratory and stable facilities enabling the Department better to meet the urgent demands which it constantly encounters.”

Dr. Martin, the former Director, was also very heartily in favor of the City having its own antitoxin farm.

I call your special attention to the report of the Director of the work of the Medical Inspector and his assistants in the examination of children; also, to his report calling attention to the great importance of improving the sanitary condition of the territory contiguous to the Schuylkill River in the Twenty-first Ward; also, the importance of a larger appropriation for the abatement of nuisances.

Bureau of Charities.

I call your attention to the Director's report of this Bureau in regard to the group of buildings—the Almshouse, Philadelphia General Hospital, and the Department for the Insane. He says:

“The three Institutions included in this group bring together the largest number of individuals congregated in a single area, under the care of a single Municipality, on the Continent. The aggre-

gate census, including employees, constantly approaches and occasionally exceeds 5,000, making the place truly a small town which can never properly be administered under existing conditions. Steps begun a number of years ago directed toward the removal of the indigent, must be urgently pushed forward, and immediately following the proper location of this group, the Municipality must look toward better provisions for the Insane. Of the Hospital and Insane Department I wish particularly to speak with more detail."

The Director has heretofore reported both on the Hospital and on the Almshouse and Insane Department—on their crowded condition and the necessity for temporary relief until the new hospital for the Indigent can be completed. The Director further reports on the Philadelphia Hospital as follows:

"Philadelphia General Hospital. This Institution is housed in a building the large part of which is three quarters of a century old and while from time to time many improvements have been instituted it probably represents the most inadequately equipped Hospital in the City. The continuous growth of the Institution has not been attended by a proportionate increase in the appropriations for its maintenance and urgently needed improvements. Toward the end of each year the supplies necessary for the comfort of the inmates not infrequently are exhausted and adequate purchases rendered impossible because the available appropriation has been expended. The close of 1905 was no exception to former years although the emergency, when properly presented to your Honor and Honorable Councils of the City of Philadelphia, was promptly met by an

appropriation adequate for the immediate needs of the Institution. Deficient funds toward the close of the year place the Institution and its unfortunate inmates at the greatest disadvantage. During that period of the year when the winter supplies should be purchased the insufficient appropriation already exhausted permits no proper preparation for winter; consequently this great charity is so placed that the advent of cold weather is attended by great inconvenience or by actual suffering. This at one time was guarded against by an emergency appropriation becoming available in September; but, during the last two years no such extra allowance was made and suffering, pitiable to observe, resulted. I would respectfully urge upon your Honor the necessity for making an adequate allowance to the Institution sufficiently early in the year to permit us to prepare for the winter's needs."

In regard to the Department for the Insane the Director reports to me as follows:

"From causes not fully appreciated the number of insane patients is constantly increasing in practically all Institutions devoted to their care. The daily census of the Department for the Insane of the Philadelphia Hospital has, during the last few years, shown a notable increase approximating about 75 per annum, and for 1905 there were 109 more patients under treatment than in any previous year. The appropriations for this Department have not kept pace with the increased population. An increase of 100 patients calculated on a per capita rate of thirty-nine cents (\$0.39) demands a daily expenditure of \$39 and for the year, \$14,235. It becomes in this way possible to calculate with the utmost

accuracy the amount of money necessary to meet the demands incident to a growing census. In addition to the deficient funds heretofore available I would respectfully call your Honor's attention to the urgent demands for more commodious quarters. It is now the custom of all large cities to arrange for the care of the chronic insane in some rural community where the unfortunate inmates may be supplied an out-door life, their physical comfort better provided for and their mental condition improved by the health giving influences of an out-door life. Properly located, on suitable ground, the cost of maintenance may be materially reduced by permitting the insane to perform such farm labor as may be best adapted to their mental conditions, thereby not only improving them physically and mentally but rendering them to a certain degree self supporting. The time is not far distant when the City of Philadelphia must make such provision for the insane and I would respectfully urge the necessity of securing from the next legislature a law permitting the Municipality to acquire and operate such property beyond the City's corporate limits and so located as to be advantageously used for the care of the indigent insane. Another point upon which it is necessary to lay particular stress is the constantly increasing difficulty in securing an adequate number of attendants. Hospitals and similar Institutions are in the open market for the purchase of labor which, as is well known, is constantly becoming more expensive; this is especially true of the intelligent class from which properly trained attendants are to be recruited. For the proper care of these patients—especially those receiving Hospital treatment—it is necessary

to obtain employees possessing educational advantages and mental receptivity of a relatively high order, and the multiple avenues open for the employment of such individuals renders it possible to obtain innumerable places more congenial and more remunerative than those ordinarily afforded by an Institution."

I strongly endorse what the Director recommends, unless we can induce the State itself to build an Insane Hospital near Philadelphia, but where they can get the property very much cheaper than the City of Philadelphia could buy it within its own borders, and to which hospital the insane could be transferred.

The Director also recommends very strongly a division for Dependent children. I think this can properly be brought about as soon as we have the buildings completed for the hospital for the indigent.

The Director states that the Department is under many obligations for the most generous assistance and practical co-operation to the Philadelphia Society for Organizing Charity, the Pennsylvania Society to Protect Children from Cruelty, the Childrens' Aid Society, the Probation Officers, the Womens' Directory, the Wayfarers' Lodge, and the Legal Aid Society and the United Hebrew Charities. He further says that the Visiting Nurse Society has continued to donate to the City the services of a highly efficient trained nurse whose work in a densely populated district in the City has demonstrated fully the desirability of employing graduate nurses in connection with the work of the medical inspection of schools.

The Director also commends Miss Ethel Ramsey, a special agent who does special work in the investigation of charity cases.

DEPARTMENT OF SUPPLIES.

This Department is the only executive department of the City government in which there has not been a change of directors during this past year. The Director's report shows great progress in the department and he refers to the prices produced by the sale of old material. Prior to 1905, this old material had been disposed of by the various departments themselves. When my attention was called to this in the latter part of 1904, I directed that all the departments should turn over to the Department of Supplies all the old unused material so that the Department of Supplies could dispose of it for the best price obtainable and turn in the proceeds in the City treasury. I refer to the Director's report for a statement of the old material sold by the department during the year 1905, and also for a tabulated statement of the appropriations for the year to the various bureaus and departments. The bills paid, the amount that merged at the end of the year, the amount that did not merge and all the unpaid bills.

The Director in his report calls attention to the fact that the number of bidders who bid on schedules during the year 1905, for the year 1906, was 1,030 and those for special bids 638, making a total of 1,668. The total number for 1904, was 952, showing an increase of 716 in one year. He also states that among the bidders are a number from other cities, which seems to be strong evidence that all bidders believe that they are on an equal footing and will be fairly dealt with.

The Director appends to his report certain rules that the department has adopted for the conduct of its business.

LAW DEPARTMENT.

The City Solicitor reports that during the year 1905, there was collected through his department \$846,499.39. His report gives the details of the collection.

He further reports that upwards of thirteen thousand liens were filed for delinquent taxes and 1,741 for municipal claims other than taxes. He sets forth in his report the number of writs of scire facias that have been issued and the number of judgments obtained by the City and the amount of the same; also the number of properties that were prepared for Sheriff's sale; also, that over 900 violations of building laws were considered; also, the number of suits brought before the magistrates and matters investigated in bankruptcy; also, the number of conveyances of real estate made and the number of desertion cases disposed of in the Court of Quarter Sessions; and the number of cases considered of indigent insane and other support cases; also, the work of the road department. I have referred to the road bureau system in another part of this report.

I refer you to his report for the particulars of the various subject matters that I have mentioned.

PHILADELPHIA MUSEUMS.

The report of the Director of the Philadelphia Museums has been sent to me, which I attach hereto, giving a statement of the work that has been done by the Museums during the past year, together with a detailed statement of the expenditures and receipts.

FREE LIBRARY.

I have also received a report from the librarian of the Free Library, which is attached hereto, and is a very full statement of the work done in the various branches as well as in the main library, and attention is called therein to the fact that the trustees now consider it time to acquire a site for a new main library and suggest that it be a lot of at least three hundred by two hundred feet in size. We have available for a main library the sum of one million dollars, provided some years ago in the loan bill. I have suggested that what we should do is to endeavor to get a site for five hundred thousand dollars and then get plans for a final building and erect enough of it at once that can be erected for five hundred thousand dollars, provided that a sufficient part of such building can be erected for five hundred thousand dollars, to immediately house the main library and then have the building enlarged from time to time as necessity demands it. Surely a site can be acquired for five hundred thousand dollars and I believe one of the size desired could be obtained for such a price within the same distance of City Hall that Broad and Pine is in and that we could start a very substantial building for five hundred thousand dollars large enough to accommodate the present demands of the main library. If we should buy the building of the Pennsylvania Museum and Industrial Art, at Broad and Pine streets, the price asked for it alone is upwards of one million dollars, and we should be buying a number of old buildings; and it is recommended in the report to alter the old building now to make it serve for library purposes for a year or two and then to tear them down and erect a new library. I entirely agree with the librarian that we should have this new main building and that we should have had it several years ago, but I would suggest that the trustees pick out a site that can be acquired

for five hundred thousand dollars or less, and have plans drawn for such a library as will be a credit to the City and large enough to accommodate the acquirements of the main library for many, many years to come. None of the new buildings of the Carnegie branches of the Free Library have yet been completed although it is expected that West Philadelphia, Lehigh avenue and Frankford will be delivered over to the trustees in the course of the next two months. The trustees of the Free Library have received from Mr. Carnegie four hundred and thirty thousand dollars out of the one million and a half of his gift, and the trustees have received from the bankers six thousand seven hundred and eighty-four dollars and fifty-nine cents interest. The estimated cost of the buildings undertaken thus far is as follows:

West Philadelphia	\$ 70,000.00
Lehigh avenue	110,000.00
Frankford Branch	55,000.00
Tacony Branch	35,000.00
Spring Garden Branch	70,000.00
Germantown Branch	70,000.00
Wissahickon	35,000.00

CIVIL SERVICE BOARD.

Last June I found it necessary for the good of the service of the City to make a change in the administration of this board; and also, to suspend the entire eligible list, as I found a number of people had gotten into the City service who were absolutely unfitted for the work that they were intended to do, and I was exceedingly fortunate in securing the services of the Hon. Frank M. Riter, as Secretary of the Board. He sends me a very interesting report of the work of the Civil Service Board, during the year 1905, to which I call your especial at-

tention. Great improvement has been made, the number of applicants for positions has very much increased, and Mr. Riter, the Secretary, in sending his report to me writes:

“This office since June last has been one of great activity. The revived interest on the part of the citizens in civil service is one of the clearest evidences that they appreciate its value in giving to them a fair opportunity of participating, after competition, in the administration of the City without the intervention of political power or the exercise of favoritism in their behalf.

“I will not at this time discuss the needs of the board as there is at present in the hands of his Excellency the Governor a bill which provides for the complete reorganization of the civil service board along the lines indicated in my communication to you upon the needs of the board, and I trust that the approval of such an act will render unnecessary a renewal of such discussion in the future.”

This bill has just been signed.

I believe under the proper working out of the Civil Service system upon the standard fixed by Mr. Riter will make a very great improvement in municipal service and if it can be rendered effective and permanent, as I believe it will, there should be no reason why this City should not be able to run its great works as economically as it could be run by any private corporation, in addition to which it will make a municipal employment permanent and not subject to the mutations of politics. I believe that it is exceedingly important for the chiefs of bureaus, inspectors and chief clerks to hold their positions permanently or during good behavior, for I am of the opinion that the city loses hundreds of thousands of dollars by

reason of the fact that employes whose duty it is to enforce rules, regulations and ordinances and be familiar with the work that is going on in his bureau may be removed from office and a new man succeed him who it will take years to become as familiar with the work of the bureau as his predecessor.

THOMAS W. EVANS' MUSEUM AND INSTITUTE SOCIETY.

This litigation is not in a very satisfactory condition. We have not been able to have any settlement made and another executor has died, further complicating matters. The estate in Paris, consisting of real estate, has very largely depreciated. Mr. Catharine, of the City Solicitor's office, has been to Paris several times on the matter and the City Solicitor's office reports on the situation as follows:

“In the fall of 1897, Thomas W. Evans, a citizen of Philadelphia, then living in Paris, died, leaving a will wherein he devised the greater part of his estate to establishing a Museum and Dental Institute in this City, to be thereafter incorporated. His will provides that if the corporation should, for any reason, be unable to take and hold said property that it should go to and vest in Charles F. Muller (a nephew), Horace S. Ely, Edward A. Crane, Arthur E. Valois, William Heberton (intermarried with a niece) and Joseph M. Wilson (who were also named as executors), in trust to apply the principal and income to the construction and maintenance of a Museum and Dental Institute to be located on the site of his former home at Fortieth and Spruce streets; in case the per-

sons above named could not or were unwilling to assume charge of the property and execute the trust, he devised it to the City of Philadelphia and to the State of Pennsylvania, in the order named, upon the same terms and conditions; and should neither the City or State be willing or legally competent to act as such trustees the property under the seventeenth clause of the will was given absolutely to the persons subsequently named as his executors with the belief therein expressed that his wishes would be faithfully observed although said persons were under no legal liability to carry them into effect; and if said persons would not or could not for any reason take the property, he then directed that it should go to his heirs at law absolutely and forever, free and discharged of all trusts.

“Immediately after the Doctor’s death Messrs. Muller, et al., made application to the French courts for possession of the estate under the 17th clause of the will by which it was devised to them, as above stated, as absolute owners and without any legal liability to devote it to establishing the Museum as provided for in preceding clauses of the will. Their application was contested and was refused by the court. Litigation thereupon ensued between the heirs, Messrs. Muller, et al., and the City of Philadelphia, relative to the disposition of the estate, each of the parties claiming to be entitled to it. The heirs contended that the provisions of the will devising the residuary estate to the establishment of the Museum and Institute were invalid and that they, the heirs, were entitled to the estate under the provision in the will by which it was given to them in the event of the clauses creating the trust being declared invalid. The City and the Trustees on the other hand united

and contended for the validity of the will, which was duly admitted to probate in Pennsylvania and New York, appeals being taken by the heirs to the Appellate Courts in those States. Pending the final determination of the question of the validity of the will both here and abroad, a settlement was deemed to be advisable *by all parties in interest* and an agreement was effected in the year 1900, by which all controversies regarding the will and the distribution of the estate were withdrawn, the litigation pending in France and America was discontinued, and Messrs. Muller, et al., were put in charge of the estate as trustees under the 16th clause of the will, charged among other things with the duty of disposing of the property and applying the proceeds to the Thomas W. Evans' Museum and Institute Society, less the amount the heirs were to receive under the agreement, and also the costs and charges for administering the estate. The legacies and \$100,000 of the amount due under the agreement, were paid by the Trustees in the course of a year or more after they were given charge of the property. After waiting a reasonable time for the Trustees to adjust the affairs of the estate, Counsel for the City and the Museum requested that they furnish the municipal authorities with a statement of its condition, but up to this time a satisfactory accounting has not been made. During the summer of 1905, Joseph W. Catharine, Esq., representing the City, went to Paris for the purpose of obtaining a full and complete account from the Trustees, and for the further purpose of urging a speedy settlement of the estate. The Trustees expressed themselves as willing to transfer the property to the City or to the Trustees of the Museum, pro-

vided an excessively large amount of money should be paid to them for commissions and services, and also that a complete and full accounting should not be insisted upon. The offer was declined until a satisfactory account should be made, and finally, the Trustees furnished a copy of a statement alleged to have been prepared and submitted by Charles F. Muller, acting as secretary to his fellow Trustees, on December 31, 1904. The statement furnished was unsatisfactory in that it did not give the information necessary to determine what disposition had been made of the funds and convertible securities belonging to the Doctor at the time of his death. By comparison with the other data however, it showed that a very large shortage had taken place since the Trustees assumed charge of the estate. A more specific account was demanded but was refused. Application thereupon was made to the official with whom information relative to the estate, under the French law, is required to be filed, with the object of examining the records, but this was refused by said official until the Trustees should authorize such inspection to be made. Failing to secure an accounting and having learned from investigations made in Paris that three of the Trustees had appropriated large sums of money to their individual use, and that they were actually dividing the rent money among themselves quarterly as they were paid, an action was instituted in the French courts to compel them to account, to be followed by an application to place the remaining portion of the estate, now consisting with the exception of works of art, furniture, &c., of two properties on the Bois de Boulogne and one on the Rue de la Pompe, in charge of a public administrator, pending the

investigation of the Trustees' accounts and the final payment of the proceeds of the sales of the properties to the Museum. In order to prosecute these proceedings and to compel the Trustees to sell the property and to have the funds brought here, it was necessary to employ French counsel. The early sale of the real estate is important for the reason of the great and continuing depreciation in its value since the Doctor's death. In 1898, a few months after he died the properties were appraised by the French authorities for the purpose of determining the amount of the collateral inheritance tax due to the government. No. 22 Avenue Kleber was then appraised at \$109,920 and was subsequently sold for \$80,000; No. 187 Rue de la Pompe was appraised at \$240,000, and was sold in December, 1905, for \$119,000; Nos. 43 and 45 Avenue du Bois de Boulogne was appraised at \$708,000 and although offered at public sale in December, 1905, for \$440,000, no bids were received for it; and the Palais des Souverains, a very desirable lot on the Avenue du Bois de Boulogne with an old mansion upon it, estimated to be worth fully \$800,000, was offered at public sale in January, 1906, for \$600,000, without any bids being received. The prices at which they were offered for sale was fixed by the French Court, by authority of which only the properties can be sold. All the properties are located in perhaps the finest residential section of Paris.

“For several years the sale of the estate in New York was delayed in consequence of litigation instituted by parties claiming as assignees of certain of the heirs who had not been consulted when the agreement of 1900 was effected. This litigation finally resulted adversely to said assignees. Since then pro-

ceedings were instituted, and are now pending, to obtain a judicial construction of the will and the agreement of 1900, for the purpose of enabling the Trustees to pass the title to the real estate. The heirs have intervened in said proceedings and contend that the balance due them under the agreement should be paid out of the New York estate. The Trustees of the Museum, on the other hand, contend that they are entitled to receive the entire New York estate for the Museum, and inferentially that the heirs are required to look to the French property for the amount due them under the agreement. The Attorney General of the State of New York has also intervened in the proceedings, it being his duty under the New York Statutes to see to the proper application of estates devoted to charitable purposes. To prosecute these proceedings and properly safe guard the interests of the City and the Museum in the New York estate, it has also been necessary to engage counsel there."

G. Heide Norris, Esq., who has been retained by the Museum, gives me a further report, as follows:

"In connection with your proposed message to Councils, you have requested that a statement should be prepared for you by counsel for the City of Philadelphia and by counsel for the Evans Museum and Dental Institute Society. As one of the latter, I would suggest the following:

"1st. In view of the present position taken by the Museum in the New York litigation, the fact should be accentuated that it was not a party to the agreement of compromise. The Museum is the primary object of Dr. Evans' charitable bounty, named in his will to be incorporated, in order that it might take the entire residue of his estate, and the duty

was charged upon his executors to deliver that residue to it. Notwithstanding their plain obligation, the executors have done everything in their power from the date of Dr. Evans' death in 1897, until the present time, to frustrate his intention, by delaying the incorporation of the Museum and by denying its right to take the fund. In the month of February, 1898, Mayor Warwick, associated with a number of prominent citizens of Philadelphia, made application to the Court of Common Pleas No. 4 of this County, for a charter for the Evans' Museum. This action was taken because the City of Philadelphia was charged under the will with the duty of administering the trust in case the Evans' Museum was unable to take the fund or did not carry out the objects of the testator.

"On October 11, 1899, the charter was approved by the Court, but almost immediately thereafter, on November 16, 1899, a petition was filed by the executors, asking the Court to revoke its approval of the charter. Afterwards, on June 25, 1900, an agreement was entered into between the City of Philadelphia, the executors and the heirs of Dr. Evans, who had previously begun proceedings to test the validity of the will. It was therein provided, inter alia, that the executors should be put into possession of the estate under Article 16, secundo, that the heirs should be paid \$800,000 out of the fund that would otherwise belong to the Museum, that the rule taken by the executors to revoke the approval of the charter should be withdrawn, and that after deducting the \$800,000, aforesaid, counsel fees, commissions, charges and disbursements, the balance of the fund should be paid over to the execu-

tors in Pennsylvania to be distributed by order of Court.

“In said agreement, the executors distinctly reserved the right to raise, in the Orphans’ Court, the question whether the Museum was entitled to take the balance of the fund and administer it.

“On August 8, 1900, the rule to revoke the charter was withdrawn and on December 21, 1900, the charter was recorded and the Evans’ Museum and Dental Institute Society then became a corporation of the State of Pennsylvania.

“Since that time the Museum has held regular meetings of its Board of Trustees, but has taken no action in the Courts of Pennsylvania or in Paris. It has, however, entered its appearance and filed an answer as defendant in the Courts of New York in the suit instituted by the executors to construe the will and the agreement of June 25, 1900. The City of Philadelphia originally maintained the laboring oar in the New York Courts, and has also appeared and answered in the aforesaid proceeding, and has had constant dealings through its counsel with counsel for the executors, looking to the settlement of the estate. Failing to bring about any settlement or accounting, although a demand for the same was made in January, 1905, the City of Philadelphia began proceedings for an accounting in Paris in June, 1905, and has recently also instituted there a proceeding for the appointment of a sequestrator.

“Finding that very little progress was being made towards the recovery of the fund, with which it was to carry out the purposes of the will and ascertaining that the estate in Paris was being wasted, and that the heirs were taking no action in this country or

in Paris, except to push their own claim for the \$800,000 in the New York proceeding, the Trustees of the Museum, in the latter part of 1905, determined to actively assert its rights as against the fund and real estate in New York. In the litigation there pending, above referred to, it maintains that the agreement is inoperative as against its claim under the will, and that the property in that jurisdiction or the proceeds thereof, should be paid directly to it by the executors. This course, actively pursued in New York, will force the heirs to take up the fight in Paris and render aid to the City in its endeavor to save something to the estate in that jurisdiction.

“2d. The many and devious methods adopted by the French executors, in order to delay settlement and to maintain possession of the estate both in France and in this country, should be fully exploited at this time. The shrinkage of the French estate to about one-half of the original estimates, the reduction of the selling price being directly attributable to the delay in disposing of it and the inadequacy of the account presented by the executors to counsel for the City, will be detailed in their statement. They will also treat of their discoveries as to the manner in which all of the personal estate in France, amounting to about \$1,200,000 has disappeared and they will also show how the executors have refused to give any details of the items of their expenditures.

“The object of the executors in holding on to the estate and in delaying settlement, has always been a matter of inquiry, but the sequel seems to disclose the answer very clearly. It is now entirely apparent why Mr. Valois, the principal of the French executors, could never be found when wanted for dis-

cussion, why he avoided interviews with counsel for the City, why he has interfered with and delayed any attempt to deal with the American executors, why he has delayed promised accounting, and it is also now apparent why the proceedings in Paris, instituted by John Henry Evans, and referred to by Mr. Catharine in his first report, pages 24 and 25, were delayed, with the consent of the executors, for a period of three years. They have also taken advantage of the Keane suit in New York to further delay matters, and did not begin proceeding there for a construction of the will, until February, 1904, almost six years after Dr. Evans' death. It is in this proceeding that the Museum is finally asserting its rights, independently of the City of Philadelphia.

“Eminent French and American counsel have differed as to the right of the Museum to take action in Paris for the protection of its rights. In that jurisdiction the City of Philadelphia has instituted the proceedings above referred to for the benefit of the Museum, but it is of the utmost importance that in the New York litigation, the Museums should stand upon its independent rights.

“Mr. Julien T. Davies, one of the foremost members of the New York Bar, is now representing the trustees in that jurisdiction, and it is advisable that the Museum should also be represented in Paris by independent counsel, if its rights are to be differentiated from the City of Philadelphia.”

The Directors of the Museum have determined that it is wise to send Mr. Catharine and Mr. Norris to Paris, immediately, so as to carry on the litigation there and compel an accounting by the surviving executors which has heretofore been refused by them. I would ask for the imme-

diate appropriation of ten thousand dollars to cover expenses. It will probably be arranged that the heirs and the City and the Museum shall all work together to compel the executors to make their long-delayed accounting.

I send, herewith, the Annual Reports of the Directors of Public Safety, Public Works, Public Health and Charities, and Supplies. I also send, herewith, the Annual Reports of the Receiver of Taxes, City Treasurer, City Controller, City Solicitor, Board of Public Education, Board of Revision of Taxes, Sinking Fund Commissioners, and Commercial Museums; and may I hope that your Honorable Bodies, with your various Committees, shall work in harmony with the Executive Departments of the City, during the next twelve months, for the common benefit of all our citizens. I have established a rule that the hour, between eleven and twelve, every day, shall be set apart and known in my office as the Councilmanic hour, during which members of your Honorable Bodies shall have priority, to discuss any business with me that you may desire.

Yours very truly,

JOHN WEAVER,

Mayor.

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

FOR THE

YEAR ENDING DECEMBER 31, 1906

OFFICERS
OF THE
DEPARTMENT OF PUBLIC WORKS

Director:
A. LINCOLN ACKER.

Assistant Director:
THOMAS L. HICKS.

CHIEF CLERK—WILLIS SHEBLE.
CLERK—ERNEST T. HANEFELD.
ASSISTANT CLERK—ANDREW L. TEAMER.
STENOGRAPHER AND CLERK—HARRY A. STOY.
STENOGRAPHER AND TYPEWRITER—ROSCOE C. LOCKWOOD.
GENERAL INSPECTOR—ROBERT C. HICKS.
OFFICIAL PHOTOGRAPHER—LEWIS R. SNOW.
ASSISTANT OFFICIAL PHOTOGRAPHER—WILLIAM SHANE.
MESSENGER—J. J. JOHNSTON.

Chiefs of Bureau:
CITY ICE BOATS—JAMES S. JEFFERSON.
GAS—DR. N. WILEY THOMAS.
HIGHWAYS—J. A. HUNTER.
LIGHTING—JOHN J. KIRK.
STREET CLEANING—WILLIAM C. FELTON (Acting).
SURVEYS—GEORGE S. WEBSTER.
WATER—FRANK L. HAND.
FILTRATION—GEORGE S. WEBSTER. (Acting.)

NINETEENTH ANNUAL REPORT
OF THE
DEPARTMENT OF PUBLIC WORKS

A. LINCOLN ACKER, Director

Philadelphia, January 2, 1906.

HON. JOHN WEAVER,
Mayor of Philadelphia.

DEAR SIR:—In accordance with the requirements of the Act of Assembly, approved June 1, 1885, Providing for the better Government of Cities of the first class, I have the honor to submit the report of the operations of the Department of Public Works for the year ending December 31, 1905,—The Nineteenth Annual Report.

The reports of the several Bureaus, herewith transmitted, give the details of operations.

The total amount of money available during the year was \$15,914,755.20, of which \$9,331,859.89 was obtained from loan and \$6,582,895.31 from direct taxation.

The expenditures during the year amounted to \$7,481,204.82 of which \$4,073,850.35 is chargeable to operation and maintenance and \$3,407,354.47 to extensions and improvements.

The receipts from all sources amounted to \$4,200,231.94.

The receipts were \$184,506.26 in excess of the receipts of 1904.

The current expenses for 1905 were \$494,780.06 less than 1904.

The total number of employees for 1905 were 79 less than 1904.

City Ice Boats.

The winter of 1904 and 1905 started in earlier than usual. There was considerable ice in the river but not sufficient to obstruct navigation until shortly after the first of January when the weather grew so severe that it became necessary to keep one boat in commission. From January 26th, the weather grew cold and continued so severe until March that all the boats were kept constantly at work until February 5, 1905, when boat No. 3 was sunk at the Delaware Breakwater by drifting on the sunken wreck of the coal barge "Santiago." From this time until March 11th, when the boats were ordered out of commission, it was all that the Bureau could do to keep the river open for navigation. It is but proper to state that almost immediately following the loss of ice boat No. 3, the Bureau completed arrangements with the Phila. & Reading Ry. Co. for the use of their ocean tug "International," the best substitute that could be procured, and it was only with the use of this boat to supplement the work of ice boats Nos. 1 and 2 that the river was kept open. Early in the year the Department arranged with Messrs. Melville and MacAlpine, Naval Architects, to prepare plans and specifications for a new ice boat, the general design of which contemplated a vessel 232 feet long on deck, 45 feet beam, 22 feet depth of hold, with 13 feet draft, equipped with three triple expansion engines of 1200 H. P. each and three propeller wheels—two aft and one forward.

On April 18, 1905, bids were opened and subsequently, in accordance with a resolution of City Councils,

the contract was awarded to the Wm. Cramp and Sons Ship & Engine Building Company for the new boat at a cost of \$350,000. The boat was launched December 28, 1905, and christened the "John Weaver" and is expected to be completed and ready for service by about February 1, 1906.

The following gives a comparison of receipts and expenditures of the Bureau for the years 1903, 1904 and 1905:

	1903.	1904.	1905.
Amount received for towage and sale of old material.....	\$810 00	\$2,319 46	\$1,485 00
Total expenditures.....	\$41,662 26	\$119,426 80	\$202,273 70

NOTE.—The heavy expenditures of 1904 was due to the complete overhauling and general repairs of the three ice boats, No. 2 being practically rebuilt.

That for 1905 being due to payments made on account of the new ice boats.

Bureau of Gas.

The appropriation to the Bureau of Gas was \$10,000, of which sum \$9,485.88 was expended for the operations of the Bureau.

The work of the Bureau is confined to testing the quality of the gas and proving its illuminating properties to see that the lessees comply with the terms and provisions of the lease, and to testing meters where consumers have reason to believe that they are registering too fast.

The average candle power of the daily tests made during the year give the following results:

January	22.98
February	22.97
March	22.94

April	23.03
May	23.38
June	23.19
July	23.01
August	23.11
September	23.84
October	23.32
November	23.11
December	23.20
Maximum monthly average	23.84
Minimum monthly average	22.94

The terms of the lease of the Gas Works require that not less than 22 candle power must be maintained.

The following results obtained from chemical analyses indicate the average composition of the gas supplied:

Carbon di-oxide	2.00%
Illuminants	10.50
Oxygen	0.90
Hydrogen	35.50
Carbon mon-oxide	24.80
Methane	23.50
Nitrogen	2.80
	100.00

Bureau of Highways.

The expenditures of the Bureau of Highways for the year were \$1,587,760.50 of which \$612,080.40 were for current expenses and \$975,680.10 for extensions. The receipts were \$225,213.20, an increase of \$12,649.89 over those of 1904.

The following statement is a comparison of expenditures for the years 1903, 1904 and 1905:

	1903.	1904.	1905.
Current expenses.....	\$647,082 61	\$647,112 16	\$612,080 40
For extensions.....	1,587,380 28	1,222,455 52	975,680 10
Total.....	\$2,234,462 89	\$1,869,567 68	\$1,587,760 50

There were 21 miles of new streets opened and graded, the work amounting to 941,401 cubic yards of excavation and fill.

Over 20 miles of streets, equal to 332,052 square yards, were paved by the city and under private contract. These pavements were of refined natural asphalt, granite block and vitrified fire clay or shale brick, all laid upon cement concrete foundation 6 inches thick.

In the matter of replacing old cobble and rubble pavements with improved pavements, the amount of work accomplished was not all that could be desired, for, while 5½ miles of streets were repaved with improved pavements on 6 inch cement concrete foundation, it is to be regretted that that quantity was not very much greater:

Work upon unpaved and macadamized public highways was continued during the year. Nearly 4½ miles of new macadam roads were built and over 122,000 square yards of resurfacing was completed. The sprinkling of the macadam roads being well attended to during the season, together with the general repairs, has kept the roads in such condition that there have been few complaints. In awarding the contract for 1906, it has been determined to so change the specifications that the contractor for the lump sum contract price will be required to furnish, deliver, spread and roll at least 60,000 tons of broken stone, and additional stone required over and above this amount is to be supplied at the rate of \$1.75 per ton delivered, spread and rolled. Under these conditions, it is believed that the work on roads of this class will be even more satisfactory than in the past.

The contract for repairs to paved streets for the year 1905 was let for the sum of \$127,000. Under this contract the streets should all have been placed in satisfactory condition by June 1st, which was not the case. Notice

was at once served upon the contractor and every effort made to have the work promptly and satisfactorily attended to. While the contractor did much better work after June 1st than had been done previous to that date, his work throughout the year was not so satisfactory as to justify any payments being made on account of work done, and at this writing the matter has not yet been adjusted. Owing to the unsatisfactory conditions brought about by the awarding of contract at a lump sum price, the Department determined upon making a change. The awards for 1906 will be based upon a separate price per square yard for each class of work, and it is confidently believed that a contract under these conditions will be altogether productive of more satisfactory results.

The work of repairing sewers, inlets and manholes was performed in a satisfactory manner, there being no serious breaks and comparatively few complaints. In one or two cases of a more serious nature, the matters have been referred to Councils with requests for ordinances authorizing reconstruction and appropriations covering the expense.

The general repairs to bridges have been carried on during the year so far as money was available. When it is considered that there are over 300 bridges in the City under the care of the Bureau of Highways, that these bridges represent a total valuation of more than \$20,000, 000, it is the merest nonsense to expect these bridges can be kept in a presentable condition to say nothing of their being kept in a safe condition with the very limited amount appropriated. Many bridges are deteriorating for the want of sufficient paint to preserve the material. Some are in a very unsafe condition for want of absolutely needed repairs, and a greater number show evidence of neglect for want of proper attention in past years, owing to the small amount of appropriations.

In the past five years the appropriations for general repairs have averaged less than \$92,000 per year, being less than one-half of one per cent of the valuation of this property.

The very small appropriations heretofore made for grading has made it impossible to keep pace with the march of improvements. There are now on hand ordinances authorizing the grading of streets which would require \$500,000 to complete the work, and as the ordinances which are being passed from time to time equal the average annual appropriations for this class of work, it will be utterly impossible for the Bureau to meet the demands of the public unless additional appropriations are provided.

The ordinance recently passed repealing the ordinance fixing \$2.60 per square yard as the uniform price to be paid by property owners for new pavements will make it absolutely necessary for larger appropriations for paving intersections and in front of unassessable property.

The inferior pavements in this City embrace 61 miles of cobble and rubble, 19 miles of old asphalt block and 20 miles of old vitrified brick, in all 100 miles of streets which should be repaved with modern improved pavements. To complete this work would require for the repaving and the work incident thereto \$3,000,000 and would take 6 years to complete the work if the appropriations were made at the rate of \$500,000 yearly. The last item embraces the old brick pavements laid about the years 1887-1890 all of which have been repaired and the bricks turned so often that it is a waste of money to attempt repairing them.

Many of the streets paved with sheet asphalt between 1876 and 1880 are in such a condition that it is practically impossible to give them the attention they should

receive under contracts for repairing streets. About 25 miles of this class of pavement, most of which was laid under three year guarantees, are in such condition that it would be great economy to provide for their complete resurfacing. First, because to neglect them longer will result in great damage to the foundation, and secondly, because under contracts for resurfacing the work can be done at a much lower price per square yard.

The total estimated cost of the resurfacing of old asphalt streets, that should be done without delay, will be approximately \$400,000.

With regard to the repairs of Railway streets where the Passenger Railway Companies refuse to comply with notices from the Bureau of Highways to make repairs, alleging that they are not responsible for said repairs because some other corporation had been permitted to open the streets, the Department would recommend an appropriation of at least \$5,000 or \$10,000, and would ask authority to make such repairs after due notice with a view of having the bills turned over to the City Solicitor to sue out, and in this way definitely and for all time fix responsibility for this class of repairs.

It may be here stated that the responsibility for this dispute, if it may be so termed, rests almost entirely upon the provision for street repairs contained in the ordinance authorizing and permitting the Keystone Telephone Company to lay underground conduits, as the provision of the Keystone Telephone Company ordinance provides that the Telephone Company's liability ceases at the end of twenty days after the repaving is done unless the Department has filed a protest against the character of the repaving before the expiration of the twenty days. It will at once appear to any thinking person that in the case of repaving over any trench that there is not likely

to be any visible sinking or depression until some time after the lapse of twenty days, even though the filling of the trench and the repaving may have been indifferently done. It may also be stated in this connection that the Bureau of Highways anticipates the same condition to follow the repairing of streets under the provisions of the ordinance granting permission to the Pneumatic Transit Company to lay its underground pipe service in Railway streets.

Early in June it was learned that much of the work being done on the Northeast Boulevard, from Broad street eastward, was not in accordance with the Department requirements. A preliminary examination was ordered, which confirmed these views.

The work was suspended. Subsequent examinations were made and as a result, the contractor was finally ordered to stop all work June 19, 1905, pending a further inspection and investigation.

Comparative Statement of Work Done in Improved Pavements.—New Streets.

	1903		1904		1905	
	Square yards.	Linear feet.	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks.....	19,594	4,725	28,797	10,758	23,491	12,348
Sheet asphalt.....	228,930	74,453	135,243	42,196	185,340	53,800
Vitrified brick.....	84,047	13,196	13,159	4,364	34,071	12,591
Macadamizing.....	269,197	141,888	63,443	32,990	46,125	23,390
Total.....	551,768	*234,26	240,642	†90,308	289,027	†102,138

Replacing Cobblestones with Improved Pavements.—Old Streets.

	1903		1904		1905	
	Square yards	Linear feet.	Square yards.	Linear feet.	Square yards	Linear feet.
Granite blocks.....	43,203	11,198	49,760	23,968	29,592	9,968
Sheet asphalt.....	28,111	10,291	27,746	9,912	52,936	15,517
Vitrified bricks.....	4,811	3,236	519	240	6,642	3,868
Total.....	76,125	*24,725	78,025	†34,120	89,150	‡29,353

*1903—Total amount of new paving, 258,987 linear feet, equal to 49 miles 267 linear feet.

†1904—Total amount of new paving, 124,428 linear feet, equal to 23 miles 2,988 linear feet.

‡1905—Total amount of new paving, 131,491 linear feet, equal to 24 miles 4,771 linear feet.

In addition to the work done by the City in the paving and repaving of streets with improved pavements, the following statement shows in detail the amount of work done by the passenger railway companies during the year 1905 :

	Linear Feet.
Resurfacing sheet asphalt.....	51,594
Granite block repaving between tracks	63,691
Total	115,285

Equal to 21 miles 4,405 linear feet at an estimated cost of \$225,000.

Comparative Statement of Work Done.

		1903.	1904.	1905.
New paving.....	linear feet.	117,069	91,348	108,101
Macadamizing (new).....	linear feet.	141,888	32,990	23,390
Grading.....	cubic yards.	1,007,522	1,120,946	991,401
New footway paving.....	square yards.	57,433	76,166	79,385
Repairs to paved streets.....	square yards.	891,064	370,868	580,443
Footways repaved.....	square yards.	18,491	37,135	22,172
Ditches repaved.....	square yards.	50,329	55,338	56,186
Gutter stone laid.....	linear feet.	4,980	.....	.....
Crossing stone laid.....	linear feet.	8,394	7,384	6,235
Curbstone reset.....	linear feet.	106,244	155,991	114,963
Wooden trunks.....	linear feet.	12,467	10,147	5,675
Brick and stone drains.....	linear feet.	1,981	1,528	927
Hand railings.....	linear feet.	4,900	4,093	4,944
Curved curb corners.....	linear feet.	10,247	16,089	10,540
New curbstone set.....	linear feet.	175,921	219,756	148,217
Vitrified brick and stone gutters.....	linear feet.	5,670	23,963	11,480
Resurfacing sheet asphalt.....	square yards.	10,672	15,307	3,169
Resurfacing broken stone.....	linear feet.	132,809	110,765	62,540
Footway, curb and railroad notices served..		25,732	31,705	25,734

The work of the Board of Highway Supervisors has been performed during the year in a satisfactory manner, the revenues amounting to \$31,110.24, and the expenditures were \$10,593.68, showing an excess of receipts over expenditures of \$20,516.56.

Comparative Statement of Transactions of the Board of Highway Supervisors.

	1903	1904	1905
Pneumatic tubes .....	.....	.....	6
For vaults.....	8	3	7
For railroad tracks, curves and turnouts...	149	110	47
For underground pipes.....	559	460	583
For electrical conduits.....	458	458	4,894
For erecting bridges.....	7	1	6
For tunnels.....	1	2	1
For drinking fountain	2	10	1
For subway.....	1	.....	.....
For connection to sewers.....	1	.....	4
Foundations for elevated railroad.....	.....	1	3
Platform scales.....	.....	.....	1

Comparative Statement of Work Done by the Draughtsmen of the Board of Highway Supervisors.

	1903	1904	1905
New street record plans prepared.....	85	47	148
Blue print plans placed on file.....	402	375	364

Comparative Statement of Receipts and Expenditures.

	1903	1904	1905
Receipts	\$24,096 56	\$25,822 68	\$31,110 24
Expenditures	11,869 83	11,120 00	10,593 68
Excess of receipts	\$12,728 73	\$14,702 68	\$20,516 56

Recapitulation.

	1903	1904	1905
Amount of earnings	\$18,382 98	\$17,274 49	\$34,928 80
Amount outstanding from previous years ..	19,372 47	12,971 08	4,422 84
	\$37,755 95	\$30,245 52	\$39,351 14
Amount received and deposited with City Treasurer	24,098 56	25,822 68	31,110 24
Amount outstanding	\$13,657 39	\$4,422 84	\$8,240 90

Bureau of Lighting.

The net appropriation to the Bureau of Lighting for 1905, was \$399,419. Of this amount \$398,582.58 was expended. The balance, \$836.42, merged at the end of the year.

During the year a change was made in the organization of this Bureau which resulted in a decrease of one Inspector and a corresponding reduction in expense account.

The following table will show the total number of lamps maintained, and under the supervision of the Bureau for the years 1903, 1904, and 1905; also a comparison of expense for maintaining lights for the same periods.

	1903.		1904.		1905.	
	Number of Lamps.	Cost during the year.	Number of Lamps.	Cost during the year.	Number of Lamps.	Cost during the year.
Gas lamps maintained by the United Gas Improvement Company.....	21,142	.....	21,444	.....	21,745	.....
Gasoline lamps.....	13,034	\$315,650 35	12,870	\$355,798 79	13,454	\$386,377 40
Gas lamps supplied by the Northern Liberties Gas Company.....	74	1,509 96	74	1,494 84	73	1,493 15
Gas lamps maintained by the Bureau of Correction.....	231	.....	231	.....	231	.....
Salaries and office expenses.....	.....	11,762 13	.....	11,592 45	.....	10,712 03
Total.....	34,481	\$328,922 44	34,619	\$368,886 08	35,503	\$398,582 58
		1903.	1904.	1905.		
Of the gas lamps maintained by the United Gas Improvement Company there were not lighted, because of their proximity to electric lights.....		121	121	121		
Of the gas lamps maintained by the Department of Charities and Correction there were not lighted, because of their proximity to electric lights.....		108	108	99		
		229	229	220		

In addition to the gas and gasoline lamps enumerated above, there are 10,968 electric lights, all of which are maintained under the care of the Department of Safety (Electrical Bureau), except 70 on Delaware avenue and Front street, between Vine and South streets, maintained by the Board of Directors of the City Trusts, free of cost to the City, making altogether the total number of public lights of all kinds December 31, 1905, as follows:

Gas Lamps	22,049
Gasoline Lamps	13,454
Electric Lights	10,968

46,471

On December 5, 1905, proposals were opened for furnishing tops and supplying gasoline and lighting the in-

candescant street lamps of the City during the year 1906. In accordance with the specifications bids were requested for both furnishing and maintaining the lamps, independent of posts, and also for furnishing the posts with the lamps and the posts to become the property of the City.

There was but one bid submitted, that of the Pennsylvania Globe Gas Light Co., to whom contract in all probability will be awarded, their proposal being \$28.50 per lamp per year for furnishing and maintaining lamps, and \$37.00 per lamp per year including sale of posts to the City.

The reduction of \$1.00 per lamp in the price bid will effect a saving of \$13,454 in the cost of lighting for 1906.

The appropriation made by Councils for the purchase of 9,223 lamp posts at \$8.50 each, making a total cost of \$78,395.50 will place the City in absolute control of all posts used in gasoline lighting, and will undoubtedly give to the City a very much better opportunity of securing real competition in the future.

Bureau of Street Cleaning.

The work of this Bureau was performed in a satisfactory manner.

The total expenditures of the Bureau during the year 1905, were \$1,538,345.01, and the following table is a comparative summary of the expenditures during the years 1903, 1904 and 1905.

	1903.	1904.	1905.
Item 1. For salaries.....	\$21,569 53	\$24,120 00	\$23,249 45
Item 2. For horsekeep.....	5,199 66	5,500 00	5,342 26
Item 3. For incidentals.....	944 12	550 00	750 00
Item 4. For cleaning streets, removal of ashes, etc.....	666,233 45	980,060 22	980,322 00
Item 5. For removal and disposal of garbage.....	516,340 00	536,310 00	557,282 00
Item 6. For removal of snow, etc.....	2,212 25	8,329 24	21,399 00
	\$1,212,549 01	\$1,550,069 46	\$1,538,345 01

	1903.	1904.	1905.
Deducted from pay of contractors for vio- lations of contracts, and which sums reverted back to the City Treasury.....	\$42,465 50	\$7,327 00	\$22,396 00

There were cleaned during the year 268,779.8 miles of streets, together with 1,032,387 inlets and 123,966 private alleys, from which were removed 197,362 cart loads of dirt.

From buildings there were removed 802,392 cart loads of ashes and 33,462 cart loads of dry waste. There were also collected and disposed of 344,901 cart loads of garbage and 23,580 dead animals.

Councils should provide liberally for the removal of snow as with the present limited appropriation, the Department is only able to remove snow from the streets in a restricted area.

In order to secure competition in bids for removal of garbage for 1906, the Department invited proposals, and bids were opened May 1, 1905. The lowest bidder on this occasion was the Urban Waste Disposal Co., whose price was \$444,000 or \$116,000 lower than the bids for 1905. Even with this saving, the price was deemed excessive and all bids were rejected and a readvertisement for proposals

was made. On July 13, 1905, bids were again opened. Three bids were submitted and that of the Penn Reduction Co. being the lowest at the price of \$399,575, the contract was subsequently awarded to them. The saving effected amounted to \$160,425.

Similar conditions obtained in connection with bids for cleaning streets, removal of ashes, &c. Bids were first opened August 23, 1905, and the price for the entire city by districts was \$917,485, or \$32,515, less than 1905. These bids were also considered excessive and new proposals were asked for and bids again opened on September 18, at which the price for the entire city by districts was \$844,272, or \$105,728 less than 1905.

The City is to be congratulated on the fact that, notwithstanding the erection of over 10,000 new buildings and the addition of 15 miles of streets, the Department has been enabled to save a total of \$266,153 for cleaning streets, removal and disposal of ashes and garbage, etc., in comparison with the cost during 1905.

The following is a statement in detail of the operations of the Bureau of Street Cleaning during the year 1905, and totals for the years 1903 and 1904.

Statement showing Total Work during the Year 1905, and Totals for Years 1904 and 1903 in Comparison.

DISTRICTS.	CLEANED.						REMOVED.					Number of Complaints of all kinds.
	Squares.	Alleys.	Inlets.	Crossings.	Market Houses.	Snow from Fire Plugs.	Number of Dead Animals.	NUMBER OF LOADS.				
								Dirt.	Ashes.	Dry Waste.	Garbage.	
First	580,806	26,572	246,027	146,388	600	5,305	4,265	36,962	161,332	7,033	30,979	571
Second.....	416,241	26,481	282,163	136,260	1,196	5,263	4,510	41,830	120,171	7,069	58,264	1,320
Third	432,722	20,042	117,081	131,851	2	2,094	5,085	34,569	130,300	5,958	88,584	604
Fourth.....	645,870	23,268	154,209	141,749	.....	3,233	5,030	37,193	179,407	6,189	90,001	769
Fifth.....	580,568	27,603	216,359	135,609	.....	4,105	4,600	35,002	193,092	7,213	73,073	521
Sixth.....	22,582	.....	15,048	14,318	.....	1,575	.....	11,806	.....	.....	.....	101
Total 1905.....	2,687,798	123,966	1,092,387	706,175	1,798	22,525	23,580	197,362	802,302	23,462	344,901	3,976
Total 1904.....	2,945,011	165,306	1,110,563	755,219	2,199	25,128	34,949	230,271	644,973	20,737	380,520	2,853
Total 1903.....	2,302,398	158,074	1,083,759	219,642	2,144	6,100	17,513	218,928	630,593	27,949	301,643	4,169

Bureau of Surveys.

The total expenditures of the Bureau of Surveys during the year 1905, were \$1,354,393.20, of which sum \$342,996.67 was for current expenses and \$1,011,896.53 for extensions. The receipts were \$149,880.24, or \$18,543.14 greater than during 1904.

The Commission appointed to fix the boundary line between Philadelphia and Delaware Counties has made its final report, which was approved by the Court of Quarter Sessions of the Peace of Delaware County on January 9, 1905, and by the Court of Quarter Sessions of Philadelphia on January 20, 1905.

Councils made no appropriation for main sewers during 1905, and work of this character could only be carried on by utilizing the balance of the amount authorized by loan Ordinance of June 27, 1904. A detailed statement of work performed on main sewers will be found in the report of the Chief Engineer.

During the year, 19.577 miles of branch sewers were constructed at a total cost of \$437,919.17.

For the reconstruction of inlets, \$5,000 was placed under contract, the amount of the appropriation. Contracts were also entered into for the construction of new inlets, manholes, laterals, &c., to the amount of \$25,354.83.

The total length of all sewers built during 1905, was 32.473 miles, divided as follows:

Main Sewers	4.410 miles
Branch "	19.557 "
Sewers built at private expense	8.486 "

The total length of all sewers constructed to January 1, 1906, is as follows:

Main Sewers	167.339 miles
Branch Sewers	773.770 "
Sewers built at private expense	100.098 "
	<hr/>
	1,041.207 "

Since the last annual report, the \$100,000 which has been appropriated for the construction of main sewers on Market street east of the City Hall, has been transferred and utilized for other purposes. This saving was effected as the result of negotiations with the Philadelphia Rapid Transit Co., whereby they have assumed the entire cost of the sewerage system on East Market street which is to be built during the construction of the subway.

While some progress has been made in the general system of improving the drainage in the southern section of the city, there still remains work to be done in the construction of new, main and intercepting sewers, the detail of which will be found in the report of the Bureau of Surveys.

The Frankford Intercepting System, the Cohocksink System and the main Sewerage System in general as outlined by the comprehensive plans of the Bureau of Surveys should be extended as rapidly as it is possible for Councils to provide the necessary funds. The necessity for this work is imperative.

In accordance with the provisions of the Act of Assembly approved April 22, 1905, creating a Department of Health and providing for the appointment by the Governor of a Commissioner of Health, plans of the sewerage system of the City of Philadelphia were filed October 2, 1905. If the provisions of this Act are carried to their logical conclusion, it will entail great expense upon municipalities, but will improve the sanitary condition of the waters of the rivers of the state now polluted by the sewerage of cities.

The negotiations which have been conducted between the City and the railroad companies for the abolishment of grade crossings along the Philadelphia, Germantown & Norristown railroad (9th street) between Spring Garden street and Hunting Park avenue, 3-1/2 miles with 30 grade

crossings; along the Richmond Branch of the Phila. & Reading Railway, between Somerset and Richmond street, 1-1/4 miles with 2 grade crossings and several new streets to be opened; and along the Philadelphia and Trenton Railroad on Trenton avenue, between Norris and Butler street, 2-1/2 miles with 33 grade crossings, has reached such a condition that there is now reasonable hope that very much will be accomplished during the ensuing year. These negotiations have reached such a stage that in all probability they will be shortly concluded and measures taken to commence the work provided for by the \$4,000,000 loan authorized by the vote of the people at the election of November 7, 1905. These projects have been fully reported upon in previous Department reports.

The construction of the Market street Subway by the Philadelphia Rapid Transit Co. has progressed to such an extent that the subway from Fifteenth street westward to the Schuylkill river was completed and opened to travel on December 17, 1905. The four-track bridge over the River Schuylkill, providing for two surface lines and two elevated lines, for the accommodation of the subway traffic has been practically completed, and the two lines for surface traffic are in use. Owing to the labor difficulties, there has been considerable delay in the work of constructing the double-track elevated railroad between the River and Sixty-third street, but at present it is thought this line will be in operation about next August.

While the construction of the subway around City Hall has been authorized by the Board of Highway Supervisors, and while some work has been done on Delaware avenue towards the construction of column foundations for an elevated structure, little has been accomplished on the subway work on East Market street due, in a great degree, to the difficulty in determining upon the arrangement and adjust-

ment of the enormous amount of underground structures which it will be necessary to rearrange, move, or reconstruct in connection with this work.

At the beginning of the year, the total amount of funds available for the construction of new bridges amounted to \$1,055,727.87 made up of balances brought from the year 1904; \$1,000,000 of this total sum had been appropriated June 27, 1904, but the appropriation Ordinance made it "Subject to future legislation by Councils," which made it impossible to use the money until Councils had first designated the bridges to be constructed. As the Ordinance of August 11, 1904, authorized the use of but \$500,000, the balance could not be used until after the approval of the Ordinance of June 13, 1905, thus making it impossible to execute contracts in time to complete the work on the various bridges within the year 1905.

While the Bureau of Surveys has made the best progress possible, under the circumstances, much important work remains to be done and many new bridges necessary to meet the requirements of the public must await future appropriations. This subject is treated more in detail in the report of the Bureau.

The following is a summary of the receipts and expenses of the District Surveyors for the year 1905, and totals for the years 1903 and 1904:

Comparative Statement of Receipts and Expenses for the Years 1903, 1904 and 1905.

Districts.	SURVEYORS.	Cash Receipts.	Credit for work done for the City	Total credit.	EXPENSES.				Balance profit to the City.	Profit to the City in 1904.	Increase.	Decrease.
					Salaries.	Pay of Asslst'nts.	Miscellaneous.	Total				
1	John M. Nobre.....	\$6,736 70	\$14,255 02	\$20,991 72	\$3,000 00	\$9,236 00	\$1,500 42	\$18,736 42	\$7,255 30	\$395 41	\$6,850 80	.....
2	Chas. W. Close.....	5,051 80	5,229 83	10,281 18	3,000 00	5,620 00	1,249 42	9,869 42	411 71	638 64	.....	\$221 88
3	W. C. Cranmer.....	6,786 88	9,506 08	16,292 96	3,000 00	7 885 59	1,892 14	12,227 73	4,065 23	5,167 05	.....	1,101 82
4	F. Bloch.....	2,613 44	7,904 93	10,518 37	3,000 00	4,946 66	1,088 83	9,085 29	1,482 88	1,374 21	108 07	.....
5	Walter Brinton.....	12,837 55	7,481 50	20,269 05	3,000 00	10,143 25	1,736 49	14,879 74	5,389 31	7,008 23	.....	1,618 92
6	Joseph Mercer.....	12,634 66	8,488 00	21,117 66	3,000 00	8,480 83	2,053 76	13,484 59	7,633 07	9,741 83	.....	2,103 76
7	W. K. Carlie.....	2,735 22	6,821 18	9,556 40	3,000 00	4,112 00	1,149 07	8,261 07	1,295 33	941 00	354 33	.....
8	C. A. Sundstrom.....	2,485 40	14,332 68	16,768 17	3,000 00	10,940 92	2,002 97	15,943 89	824 88	1,162 97	.....	\$38 69
9	Joseph C. Wagner....	9,207 81	11,320 00	20,526 81	3,000 00	11,089 96	1,679 72	15,769 68	4,767 13	2,466 18	2,900 95	.....
10	John H Webster, Jr..	5,446 60	13,666 10	19,112 70	3,000 00	8,624 65	1,289 68	12,914 33	6,198 37	7,700 83	.....	1,502 46
11	Joseph Johnson.....	13,745 59	6,030 66	19,776 25	3,000 00	9,776 00	1,954 07	14,730 07	5,046 18	3,186 27	.....	3,140 00
12	J. H. Gillingham.....	23,151 18	13,316 05	36,467 23	3,000 00	9,195 32	1,511 16	13,706 48	22,760 75	19,019 60	3,741 06	.....
13	H. M. Fuller.....	7,899 95	9,817 90	17,719 85	3,000 00	9,388 67	1,732 27	14,120 94	3,596 91	3,806 87	.....	9 96
14	C. B. Webster.....	2,911 57	16,301 84	19,713 41	3,000 00	8,774 00	1,677 30	13,451 30	6,262 11	5,904 18	357 93	.....
Total 1905.....		\$114,104 44	\$144,925 27	\$259,119 71	\$42,000 00	\$118,113 85	\$22,017 30	\$182,131 15	\$76,989 16	\$73,308 36	\$13,722 83	\$10,042 6
Total 1904.....		\$101,004 77	\$152,439 89	\$253,444 66	\$42,000 00	\$117,707 25	\$20,429 05	\$180,136 30	\$73,308 36	\$67,303 84	\$16,383 19	\$11,063 67
Total 1903.....		\$102,396 61	\$150,593 33	\$252,989 94	\$42,000 00	\$114,996 40	\$27,999 70	\$184,996 10	\$67,993 84	\$58,522 53	\$17,500 43	\$3,029 17

The following is a comparative statement of the operations of the Registry Division of the Bureau of Surveys during the years 1903, 1904 and 1905:

Registry Division.

	1903.	1904.	1905.
Number of certificates of registered owners issued.....	4,223	4,396	4,820
Number issued for use of Law Department.....	547	575	742
Receipts from certificates of registered owners.....	\$1,054 02	\$1,102 00	\$1,201 50
Receipts from miscellaneous sources.....	\$216 60	\$383 10	\$336 90
Number of original lots plotted.....	10,171	12,099	12,811
Number of transfers registered.....	35,369	37,765	40,541
Number of plans made for use of City Departments, Bureaus, etc.	501	62	264
Number of examinations of registry plan books made by the public.....	54,838	57,088	60,327
Number of descriptions of property filed for registry...	45,540	49,864	53,352
Number of titles perfected.....	2,361	2,047	2,094
Number of certificates of legal opening of streets issued to Bureaus, etc.....	2,078	1,703	2,461
Number of certificates of registered owners in municipal lien cases for Law Department.....	1,181	668	912
Number of certificates of registered owners in municipal lien cases for Receiver of Taxes.....		1,086	895

Comparative Statement of Main, Branch and Private Sewers built during the years 1903, 1904 and 1905.

	1903.		1904.		1905.	
	No.	Linear feet	No.	Linear feet.	No.	Linear feet.
Intercepting sewer extensions.....	3	12,497.48	3	1,332	1	679
Main sewers.....	29	30,983.93	23	11,984	20	22,608
Branch sewers.....	103	82,588.89	157	113,514	155	103,370
Private sewers.....	58	21,421.00	62	30,256	75	44,806
Total.....	193	*147,441.30	245	†157,086	251	‡171,463

* Equal to 27.92 miles. † Equal to 29.75 miles. ‡ Equal to 32.47 miles.

Comparative Statement of Work upon Bridges during the years 1903, 1904 and 1905.

	1903.	1904.	1905.
Finished.....	6	5	3
Begun	5	3	6
Authorized.....	3	9	9
Planned.....	5	9	5

Comparative Statement of Receipts.

Year.	Receipts of Bureau.	Receipts of District Surveyors.	Total.
1903.....	\$23,005 94	\$102,396 61	\$130,402 55
1904.....	30,382 33	101,004 77	131,387 10
1905.....	34,147 40	114,194 44	149,880 24

Comparative Statement of Expenditures.

	1903.	1904.	1905.
Current expenses.....	\$275,701 08	\$261,318 34	\$263,968 53
For extensions.....	1,560,003 80	903,379 68	1,090,924 67
Total.....	\$1,835,704 88	\$1,164,698 02	\$1,354,893 20

Bureau of Water.

The total expenditures of the Bureau of Water for all purposes during the year (not including supplies furnished through the Department of Supplies) were \$1,746,025.71, of which \$945,389.16 were for current expenses and \$800,636.55 were for extensions and improvements.

The receipts for the year were \$3,790,447.26 or \$146,776.13 in excess of the receipts of the year 1904.

The total revenue from water rents, etc., from the installation of the Water Works, 1799, to December 31, 1905, amounts to	\$91,232,768.65
The total expenditures for maintenance and construction, including amounts paid for improvement, extensions and filtration of the water supply, for the same period, amounts to	72,213,364.19
The net profit earned by the Bureau from the installation of the works (exclusive of interest)	<u>\$19,019,404.46</u>

The Water Supply of the City has been more satisfactory during 1905 than for several years past, particularly during the last eight months of the year, when extensive repairs were made to pumping machinery which considerably improved its condition.

The total consumption of water during 1905, computed from plunger displacement, was equal to an average rate of 326,630,253 gallons per day. The average per capita consumption was 227.2 gallons, a decrease as compared with 1904 of 5.9 gallons.

While the demand upon the several pumping stations was generally met in a satisfactory manner, the rapidly increasing population in the West Philadelphia district made it almost impossible for the Belmont Station to keep pace with the demand. On November 3, 1905, proposals were opened and contract awarded for the construction of ten new boilers for this station at a cost of \$42,000 and preparations are in progress for new boiler house and chimney at a cost approximating \$60,000. These improvements, it is believed, will be completed in the early part of the ensuing year; and it is confidently believed they will enable the Bureau to pump sufficient water, with the present engines, to supply all of West Philadelphia with filtered water until such time as arrangements can be made for new engines, and an additional pumping main together with an extension to the engine house, as has been previously recommended.

Similar extensions are required at other stations and by reference to the report of the Bureau, it will be seen that the recommendations urgently required for immediate improvements covering engine and boiler houses, coal shed, pumping engines and supply mains, amount to a total sum of \$708,000, which it is hoped Councils will be able to provide at an early day.

In several sections of the city great difficulty is experienced for the want of large distributing mains to carry water to central points of distribution. Owing to this deficiency there are localities all over the city where the supply is insufficient and where the pressure is too low; these conditions can only be relieved by liberal appropriations for purchasing and laying service mains.

Another item causing great annoyance to builders and restricting in a great measure the development of suburban sections, is the want of sufficient appropriations to enable the Bureau to lay the small service mains for supplying new operations, as well as to meet the demand required for pipe to be laid in streets ordered to be paved by ordinances of Councils. There is now of record in the Bureau of Water applications from builders and owners for upwards of 90,000 feet of pipe to supply the requirements of new building operations and these applications cannot be granted unless liberal appropriations are provided to cover the expense.

During the year, there was laid for the distribution of water, 159,307 feet of these service mains, 47,537 feet in excess of that laid in the year 1904. The demands indicate that a greater quantity should be laid during the ensuing year.

The total quantity of pipe now in service is about 1,500 miles.

The total number of fire hydrants being 14,311.

*Comparative Statement of Receipts and Expenditures for
the years 1903, 1904 and 1905.*

	Receipts, 1903.	Receipts, 1904.	Receipts, 1905.
Receipts from water rents.....	\$3,275,997 53	\$3,368,408 06	\$3,485,213 65
Receipts from fractional rent.....	68,992 21	66,156 60	77,422 23
Receipts from water pipes.....	128,265 82	85,003 76	128,599 68
Receipts from City Solicitor's office....	43,555 83	37,887 35	66,671 66
Receipts from penalties.....	31,512 60	32,589 27	23,320 34
Receipts from delinquent rent.....	31,041 32	36,607 50	30,664 70
Receipts from Chief Engineer's office...	7,700 19	8,627 62	10,392 29
Receipts from searches.....	3,021 75	2,986 75	3,306 50
Receipts from delinquent penalties.....	4,657 72	5,454 22	5,856 21
Total.....	\$3,594,753 97	\$3,648,671 13	\$3,790,447 26
	Exp'nditures, 1903.	Exp'nditures, 1904.	Exp'nditures, 1905.
Current expenses.....	\$1,463,065 14	\$1,526,954 06	\$945,389 16
For extensions.....	6,074,269 48	3,392,676 32	800,636 55
Total.....	\$7,537,334 62	\$4,919,630 38	\$1,746,025 71

Statement relating to Pipe Laying and Fire Hydrants Placed.

YEAR	PIPE LAID.			*PIPE RELAID.	FIRE HYDRANTS PLACED IN POSITION.			SUBSTITUTED FOR DEFECTIVE HYDRANTS.			Fire Hy- drants in Use.	New Water Attach- ments.	
	Feet.	EQUAL TO			Feet.	New Style.	Old Style.	Total.	New Style.	Old Style.			Total.
		Miles.	Feet.										
1903.....	186,891	25	4,801	†15,254	848	.....	848	190	.....	190	13,647	5,637
1904.....	111,770	21	890	‡28,719	870	.....	870	229	1	230	14,017	5,780
1905.....	159,807	80	907	‡17,768	845	.....	845	824	2	826	14,811	8,097

Total pipe laid, 496.83 miles.

* Adds nothing to feet in ground.

† 1903. Pipe taken up is less than quantity relaid 1,882 feet.

‡ 1904. Pipe taken up exceeds quantity relaid 462 feet.

‡ 1905. Pipe taken up exceeds quantity relaid 616 feet.

Statement of the Location, Date of Completion, Elevation and Capacity of the City's Reservoirs.

Name of Reservoir.	Location.	Date of Completion.	Height ab've City Datum.	Capacity in Gallons.	
Fairmount. {	Reservoir No. 1..... Reservoir No. 2..... Reservoir No. 3..... Reservoir No. 4, Section 1. Reservoir No. 4, Section 2. Reservoir No. 4, Section 3. }	East Fairmount Park.....	94 feet...	26,850,000	
					1815
					1821
					1827
					1835
1836					
Spring Garden.....	Twenty-sixth and Master streets.....	1844	120 "	12,950,000	
Corinthian.....	Corinthian avenue and Poplar street.....	1852	120 "	27,341,000	
East Park.. {	Section 1..... Section 2..... Section 3.....	East Fairmount Park.....	133 "	306,400,000 319,480,000 205,620,000	
					1887
					1888
1889					
Queen Lane {	North Basin..... South Basin.....	Thirty-third street and Queen lane.....	1894	238 "	177,480,000
Frankford.....	Oxford turnpike and Comly street.....	1877	167 "	36,046,000	
Belmont.....	West Fairmount Park.....	1870	212 "	39,758,000	
Belmont.....	Belmont and City avenues.....	1903	279 "	72,000,000	
Belmont Clear Water Basin.....	Monument avenue and Ford Road.....	1903	239 "	16,500,000	
Mount Airy.....	Allen's Lane and Mower street, Germantown.....	1851	363 "	4,546,000	
Roxborough.....	Ridge and Shawmont avenues.....	1866	366 "	12,838,000	
Roxborough Clear Water Basin.....	Dearnley and Fowler streets.....	1903	325.75 "	3,000,000	
New Roxborough. {	North Basin..... South Basin.....	Port Royal avenue and Ann street.....	1893	414 "	71,594,000 75,438,000
New Roxborough Clear Water.....	Port Royal avenue and Hagy street.....	1903	410 "	8,000,000	
Belmont Stand Pipe.....	West Fairmount Park.....	1895	364 "	106,000	
Roxborough Stand Pipe.....	Port Royal avenue and Ann street.....	1895	491 "	106,900	
Frankford Stand Pipe.....	Oxford turnpike and Comly street.....	1900	300 "	106,000	
*Oak Lane.....	Fifth and Medary avenue.....	1904	210 "	70,000,000	
Total.....				1,568,397,000	

* Not connected with Distribution system for service.

Statem

Spring Garden
Old
Old
Old
Old
Old
New
New
New
New

Queen
Queen
Queen
Queen

Belmont
Belmont
Belmont
Belmont
Belmont
Belmont
Belmont

Belmont
Belmont

Roxboro
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Roxboro

	1903. Gallons.	1904. Gallons.	1905. Gallons.
Pumped to reservoirs.....	124,015,984,600	126,181,026,489	125,867,447,176
Equal to gallons pumped 100 feet high.....	248,768,906,004	251,214,168,044	261,281,445,628

NOTE.—The "pumped to reservoirs," etc, includes 5,888,805,385 gallons or repumpage to higher levels at Belmont, Roxborough, Roxborough Annex, Mt. Airy, Chestnut Hill and Frankford High Service Stations, which deducted from the total pumped, gives a total pumpage from rivers of 19,488,641,811 gallons.

The quantity stored in reservoirs on December 31, 1905, was 263,599,402 gallons more than that stored on December 31, 1904. This quantity deducted from the total pumpage from rivers makes the total consumption for 1905, 119,220,042,409 gallons. The cost of pumpage is based on the total pumpage. The consumption per capita is computed from the average consumption during 1905, of 326,630,253 gallons per day.

	1903. Gallons.	1904. Gallons.	1905. Gallons.
Pumped by water power	7,786,981,408	6,965,281,094	7,081,998,186
Pumped by steam power.....	116,279,558,266	119,215,745,895	118,885,458,990
Largest quantity pumped in 24 hours.....	884,893,464	889,185,408	894,722,998
Smallest quantity pumped in 24 hours.....	213,150,635	274,725,827	272,124,092

Year.	Average daily consumption.	Average consumption in gallons per capita per day.*	Cost of one million gallons pumped one hundred feet high.
	Gallons	Gallons.	
1903.....	327,278,153	287.5	\$5 20
1904.....	328,289,075	238.1	5 11
1905.....	326,630,253	227.2	4 61

* Estimating the population at, 1903, 1,378,298; 1904, 1,407,690; 1905, 1,437,730.

The cost of pumping one million gallons 100 feet high during 1905 was \$4.61 or 50c. less than during the previous year. About five and three-fifths per cent. of the total pumpage was by water power, the turbine wheels using 210,959,795,580 gallons to pump 7,031,993,186 gallons.

Bureau of Filtration.

There has been appropriated to date for the improvement, extension and filtration of the water supply \$22,500,000 from loans and direct taxation. Of this sum there has been charged off on account of contracts to date \$21,745,127.21, leaving the available balance December 31, 1905, \$754,872.79.

During the year just closed the expenditures for all purposes amounted to \$611,605.98, as follows:

For salaries and administration expenses	\$104,813.66	
For maintenance, Lower Roxborough,...	\$13,024.38	
For maintenance, Upper Roxborough,...	16,776.43	
For maintenance, Belmont,	39,604.38	69,405.14
For maintaining pumps at Lardners Point.....		5,845.39
For improvements and extensions.....		431,541.29
Total		\$611,605.98

The quantity of water filtered at the several stations in operation, the daily average and cost per million gallons (not including cost of wash water used in transportation and washing sand) is shown by the following table:

STATIONS.	Total gallons.	Daily average.	Cost per million gallons.
Lower Roxborough.....	3,580,267,000	9,627,000	\$3 60
Upper Roxborough.....	3,681,428,000	10,006,000	4 56
Belmont.....	9,582,126,000	26,252,000	4 13
Total.....	16,798,816,000	45,975,000	\$4 13

The relative cost of the work at the several stations in operation during the year is shown by the following table:

	Lower Roxborough.	Upper Roxborough.	Belmont.
Average cost to scrape per cubic yd.	\$0 19	\$0 18	\$0 21
Average cost to remove per cubic yd.	25	22	23
Average cost to wash per cubic yd..	15	09	09
Total average cost per cubic yard.	\$0 59	\$0 49	\$0 53
Average cost per million gallons to scrape, remove and wash sand...	\$0.521	\$0.390	\$0.825
Average cost per million gallons to scrape, transport, wash and re- store sand to beds.....	.790	.680	1.250

The increased cost per million gallons of water filtered, for scraping, washing and restoring sand at Belmont, as compared with Lower and Upper Roxborough, is due to the fact that the applied water at Belmont carries more suspended matter for the reason that it receives only an average of about 2½ days sedimentation, while at Lower Roxborough the water receives a day's sedimentation and is treated by the preliminary filters before being applied to the final filters, and at Upper Roxborough the water receives about 15 days sedimentation. This condition requires that the filters at Belmont must be scraped oftener and the yield between the scrapings is considerably less and the quantity of sand handled per million gallons of water filtered is correspondingly increased.

The following statement shows the difference with reference to the yield and the sand handled per million gallons of water filtered at the three stations:

Average million gallons filtered per acre per run.

Lower Roxborough,	141.15
Upper Roxborough,	151.00
Belmont,	85.00

Average cubic yards of sand scraped per million gallons of water filtered.

Lower Roxborough, .....	.88
Upper Roxborough, .....	.80
Belmont,	1.57

On June 15, 1905, Mr. John W. Hill, Chief of the Bureau, resigned, and Mr. George S. Webster, Chief Engineer, Bureau of Surveys, was placed in charge of the Bureau of Filtration as Acting Chief. About the same time a Board of Engineers consisting of Major Cassius E. Gillette, U. S. A., William Barclay Parsons and John Donald MacLennan were appointed to investigate the Bureau.

The Board of Engineers has been engaged in making an exhaustive examination of the operations of the Bureau, analyzing the various contracts and studying the methods by which the work of the Bureau has been conducted. At this writing the final report of the Board has not been received. On June 16, 1905, all the work in connection with contracts at Torresdale, the Lardner's Point pipe distribution system and the preliminary filters at Belmont were suspended. On June 20, contract No. 50 for the Lateral Collectors and Filtering Materials at Torresdale was annulled, and on July 22, contract No. 31 for Coal Handling Machinery and Pockets for Lardner's Point Pumping Stations Nos. 2 and 3 was suspended.

Owing to the suspension of contracts above mentioned, work has necessarily been delayed pending the investigation being conducted by the Board of Engineers, and it is hoped that a decision will be reached at an early day, as it is desirable for every reason that the work of construction may be renewed and pushed to completion at the earliest possible moment.

Statement of Contracts Suspended or Annulled, Showing Limit of Contracts, Percentage of Work Completed, Estimates, Payments made and Balance held.

Contract Number.	CONTRACTORS.	Date.	Limit of contracts.	Work completed.	Face of estimates.	Amount paid.	Balances.
25	Daniel J. McNichol.....	June 16.	\$5,000,000	99 per cent.	\$4,884,192 91	\$4,842,854 38	\$157,645 67
28	Daniel J. McNichol.....	June 16.	1,700,000	76 "	1,444,465 08	1,381,446 15	818,568 85
39B	Daniel J. McNichol.....	June 16.	226,000	20 "	45,411 84	40,870 21	185,129 79
39T	Daniel J. McNichol.....	June 16.	1,354,000	7 "	112,989 80	101,690 82	1,252,309 18
34	Daniel J. McNichol.....	June 16.	180,000	44 "	51,778 80	46,595 97	133,404 08
54	Daniel J. McNichol.....	June 16.	570,000	92 "	501,405 78	481,873 41	88,126 59
50	Daniel J. McNichol.....	June 16.	700,000	88½ "	251,150 00	213,477 50	486,522 50
31	Henderson & Co., Ltd.....	June 20.	115,000	0 "	.....	.....	115,000 00
68	Ryan & Kelley.....	July 22.	350,000	70 "	245,862 24	206,557 90	141,412 10
	Totals .....	.....	\$10,195,000	.....	\$7,586,750 40	\$7,916,866 29	\$2,578,133 71

NOTE.—All of the above contracts were suspended on the date given except contract No. 50, which was annulled on June 20th. In the case of contract No. 68, the work has been continued by the contractors, and is nearly completed, but the payments on account of this contract have been suspended upon the recommendation of the Chairman of the Board of Engineers appointed to investigate the filtration contracts.

In the report of the Chief of the Bureau of Filtration will be found a very comprehensive and instructive table showing typhoid fever cases and the rate per 100,000 of population. This table covers cases reported for the year 1905, from which the following has been taken:

LOCALITY.	Population.	Cases.	Per 100,000
City of Philadelphia.....	1,491,247	6,451	8.82
21st and 22nd Wards.....	113,755	192	3.51
28th and 38th Wards.....	89,142	289	6.74
West Philadelphia.....	181,941	562	6.05
Wards, 23, 25, 33, 35.....	144,968	2,105	27.59
Filtered water district in West Philadelphia.....	41,424	15	0.71

The information afforded by a study of this table would indicate that that portion of West Philadelphia supplied with filtered water was being greatly benefitted by the service and would just as conclusively prove that the northeast section of our city needs the filtered water as soon as it is possible to complete the plant and furnish a supply of pure water.

Changes in the Service.

Peter E. Costello, Director, removed May 23, 1905.

A. Lincoln Acker, Director, appointed May 23, 1905.

William H. Baker, Assistant Director, resigned June 2, 1905.

Thomas L. Hicks, Assistant Director, appointed on temporary duty June 2, 1905, and made permanent June 28, 1905.

William H. Brooks, Chief Bureau of Highways, resigned June 6, 1905.

Frank E. Smith, appointed Acting Chief, June 6, 1905.

William E. Maher, appointed Acting Chief, on temporary duty, July 7, 1905, and resigned July 28, 1905.

Jerry A. Hunter, appointed Chief Bureau of Highways, August 7, 1905.

Samuel Sutcliffe, Chief Bureau of Street Cleaning, resigned October 19, 1905.

William C. Felton, appointed Acting Chief, on temporary duty, October 20, 1905.

John W. Hill, Chief Bureau of Filtration, resigned June 15, 1905.

George S. Webster, Chief Bureau of Surveys, appointed Acting Chief of the Bureau of Filtration, June 15, 1905.

General.

The policy of awarding contracts without favor to the lowest responsible bidders has been rigidly adhered to. Competition has been encouraged and contractors given to understand that all work must be satisfactorily performed for the city, precisely on the same principle that would be applied to private business.

As circumstances will permit, specifications for the several classes of work in the various bureaus are being studied with a view of revising them to the end that their full purpose and intent shall be clearly expressed, and to reduce the question of competition to the fewest possible number of items, thereby avoiding confusion and misunderstanding.

Pursuant to the policy inaugurated in June last, it may not be out of place to state that as the result some economies have already been effected. Briefly summarized they are as follows:

On account of salaries, wages and horse keep,	\$139,282.10
Gasoline lighting,	13,454.00
Street cleaning,	105,728.00
Removal of garbage,	160,425.00
Sand for filtration	346,786.00
Total,	<u>\$765,675.10</u>

The saving in the first item is by a reduction in the number of employees in the service as compared with the year 1904. The saving in the second, third and fourth items being reductions in contract prices for 1906, as compared with the cost of the work in 1905. The reduction in the last item was brought about by the annulment of Contract No. 50, for filtering materials, and re-advertising for the amount of material required to complete the contract.

Passenger Railway Streets.

While the work of the Passenger Railway Companies in maintaining the pavements on the streets occupied by their tracks and their electrical construction is generally satisfactory, and which, as a rule, they promptly meet the requirements of the Department, there are one or two subjects of importance to the public which should be considered and settled definitely. The first, and perhaps the most important, is the difference of opinion which has arisen regarding the responsibility for the maintenance of the pavements on certain passenger railway streets where the Keystone Telephone Company has been permitted to enter and construct conduits, and which difference of opinion will also apply to streets being torn up for the construction of the tubes of the Pneumatic Transit Company. Another important subject which should be determined at once is the fact that there are to-day in Philadelphia some sixty streets, parts of which are occupied by the tracks and electrical construction of the Passenger Railway Companies for a distance, in the aggregate, of 186 blocks, or about 16.50 miles, over which there is not run a single car for the accommodation of the travelling public. Furthermore, there are nineteen streets occupied for a distance of about 32 blocks with the conduits of the Passenger Railway Com-

panies, upon which no tracks are laid, in all nearly twenty miles of public highways occupied by these Companies for which no public service is rendered to the travelling public. Two of these streets have never been repaved with improved pavements and quite a number of them which have been repaved are in bad condition for want of proper repairs. In this connection, it will be interesting to note the following taken from one of the trolley ordinances. It will serve to show the responsibility resting upon these Companies :

“Before any permits shall be issued by the Departments of the City of Philadelphia to proceed with the work of constructing the railway and trolley system authorized by this Ordinance, the said railway company shall enter into an agreement or contract with the Mayor of the City * * * which agreement or contract shall * * * among other things provide; that the said railway company shall agree to keep and maintain in good order at all times, whether paved, macadamized or unimproved, all streets, avenues or roads traversed by its lines of railway or by its trolley system; that the said railway companies shall agree to accept as binding upon it the terms and conditions of all laws and ordinances now in force, or which may hereafter be passed, relating to the government, control or regulation of railways or railroads of any kind within the City of Philadelphia.”

“That in the construction and equipment of its road beds, cars or its trolley system, all kinds and character of materials, supplies or workmanship, plans, profiles, elevations, designs, etc., shall be subject, in every way, at all times to the approval and inspection of the Departments of Public Works and Public Safety.”

“That the said company shall take down and remove the overhead trolley system whenever directed to do so by the Ordinance of Councils.”

“That the said railway company shall run cars over their entire line at intervals not exceeding five minutes, between the hours of six and nine A. M. and five and eight P. M. and at intervals not exceeding ten minutes at all hours of the day, excepting between the hours of twelve midnight and five A. M. when they shall run at least every hour.”

“That the said railway company shall furnish and execute a bond in the form approved by the City Solicitor, with security approved by the Mayor in the sum of twenty-five thousand (25,000) dollars, conditioned upon the faithful execution and carrying out of all the terms and conditions of this ordinance.”

“That the said company shall * * * *
repave in good substantial and workmanlike manner * * * * all streets to be occupied by it not already repaved with such improved pavement, and also all other streets heretofore repaved with an improved pavement, the repaving of which is not satisfactory * * said repaving to be done from curb to curb for such length of street as shall be occupied by poles and trolley wires or by other electric motive power system.”

While the above quotations are from one ordinance, and while there may be a slight variation in the phraseology of the different ordinances, it will be found, upon careful examination, that the intent, purpose and obligations imposed by the several ordinances are substantially correct. It is suggested that the interests of the public would war-

rant Councils passing an ordinance authorizing the Mayor and Departments to take such steps as would compel a literal compliance with the provisions of the trolley railway ordinances and compel the companies to run cars wherever streets are occupied by tracks and compel them to complete the work of repaving any street or streets occupied by tracks, conduit, or other trolley railway construction.

Director's Office.

The work of this office goes on from year to year with practically the same force, and about the same expense. The assistants and clerks are required to devote whatever time is necessary to keep up the business of the Department which frequently requires some of them to work overtime and late into the evening.

The work of the official photographer continues to grow in volume and this branch of the service proves more valuable to the City each year. The following table shows the work performed during the years 1904 and 1905:

	1904	1905
Photo negatives made	904	1,039
Photo prints made	2,385	2,296
Photo prints mounted	837	2,746
Lantern slides made	110	133
Negatives indexed	386	396
Enlargements made	54	0
Cuts filed	0	115
Films developed	0	872
Prints of films	0	1,759
Blue prints from negatives	0	1,872
Blue printing, square feet	117,000	122,009
Value if done by contract		\$6,631.46
Cost for salaries and materials		4,781.38
Approximate saving to the city		<u>\$1,850.08</u>

In addition to the saving to the city as above indicated, there is the more important value of having this branch of

the work at the ready command of the Department, as many of the records and negatives made by the Department photographer are invaluable to the City in case of damage suits arising from many causes.

The following is a summary of the expenditures of the Director's Office for the years 1903, 1904, and 1905 :

ITEMS.	1903.	1904.	1905.
Salaries	\$22,720 00	\$24,320 00	\$24,320 00
Horsekeep.....	1,399 98	1,400 00	808 71
Printing, stationery, etc.....	3,299 87		
Advertising, incidentals, etc.....		1,450 00	1,608 55
Fitting up rooms for photographer.....	2,498 75		
Torresdale Fish Hatchery.....			5,000 00
	\$29,918 60	\$27,170 00	\$31,732 26

Deducting the expenditures on account of the Torresdale Fish Hatchery, it will be noted that for conducting the Director's Office for 1905, the expense was but \$26,732.26; less than either of the two preceding years.

In closing this report it is but justice to place upon record the acknowledgment and appreciation due the able Assistant Director, the heads of the several Bureaus and their Assistants, for the cheerful and courteous manner in which they have co-operated in the work of the Department.

Respectfully submitted,

A. LINCOLN ACKER,
Director.

ANNUAL REPORT
OF THE
BUREAU OF WATER
FOR THE YEAR 1905

OFFICERS
OF THE
BUREAU OF WATER

Chief,
FRANK L. HAND.

General Superintendent,
ALLEN J. FULLER,

Chief Clerk,
J. T. HICKMAN.

Assistants to Chief,
WILLIAM WHITBY, **H. J. JOHNSON.**

Correspondence Clerk, P. DEHAVEN.

Chief Draughtsman,
JOHN E. CODMAN.

Draughtsmen,

Martin Murphy,	James H. Hand, Jr.
John R. Gorman,	Charles B. F. Waller,
Andrew P. Peterson,	Joseph D. Austin,

Assistants to Chief Clerk.

Thomas Spence,	A. H. Raven.
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Time Clerk—Walter R. Timby.

Clerk—George G. Whitby.

Assistant Clerk—Kennedy McNeal.

Search Clerk—John S. Todd.

Assistant Search Clerk—John J. Maxwell.

Assistant Clerk—John J. Barney.

Pipe Inspector—Max M. Segl.

Pipe Clerk—Charles H. Pyrah.

Messenger—Haines Lewis.

Janitor—David Richards.

Watchman—James Robinson.

Watchman—George Harper.

Construction and repair shop; Twelfth and Reed streets.

Superintendent of Shop—James H. Dean.*Clerk*—Morris P. Getz. Died Nov. 10, 1905.*Watchman*—John W. Watkins.**Purveyors' Districts**

FIRST DISTRICT OFFICE, 1120 Wharton Street.

Purveyor—Charles T. Erichson.*Clerk*—Wm. J. Mackey. Resigned Dec. 15, 1905.*Assistant Clerk*—James McCracken.*General Foreman*—Peter Carrigan.*Foreman of Repairs*—W. W. Wellington.*Hydrant Inspector*—James Preston.*Watchman*—John H. Peterson.

SECOND DISTRICT OFFICE, 918 Cherry Street.

Purveyor { Joel M. Paullin. To June 29, 1905.
{ J. H. Bilyeu. From Dec. 1, 1905.*Clerk*—John G. Campbell.

Albert Mancher. To July 31, 1905.

Assistant Clerk Wm. J. Kelly. From Aug. 1, to Dec. 4, 1905.*General Foreman*—Fred J. Gheen.*Foreman of Repairs*—Edw. Homan.*Hydrant Inspector*—Robert S Hughes.*Watchman*—J. D. Kirkpatrick.

THIRD DISTRICT OFFICE, Beach St. and Susquehanna Ave.

Purveyor—Charles J. Lowry.*Clerk*—Edwin Green.*Assistant Clerk*—Milton Fredericks.*General Foreman*—Robert Glenn.*General Foreman*—James Hutchinson. To July 15, 1905.*Foreman of Repairs*—Wm. P. Yetter.*Hydrant Inspector*—Thos. P. Cowden.*Hydrant Inspector*—Henry Flake.*Hydrant Inspector*—Wm. Gerstner.*Hydrant Inspector*—John R. Horn.*Watchman*—Jas. H. Jebbs, to October 25, 1905.

FOURTH DISTRICT OFFICE, Twenty-sixth and Master Streets.

Purveyor—John Montgomery.

Clerk—Philip S. Thomas.

Assistant Clerk—Jay T. Wilson.

Assistant Clerk—William W. Davis.

General Foreman—George W. Showaker.

Foreman of Repairs—John Richards.

Yardman—Thos. F. Kelley.

Hydrant Inspector—Wilson Lancaster.

Hydrant Inspector—John H. Zepp, Jr.

Watchman { Henry S. Martin, To July 15, 1905.
John H. Martin, From August 23, 1905.

FIFTH DISTRICT OFFICE, 4377 Manayunk Avenue.

Purveyor—H. A. Markley.

Clerk—F. J. Cornman.

General Foreman—Wm. H. Dawson.

Foreman of Repairs—George Rittenhouse.

Hydrant Inspector—Jos. R. Gardy.

SIXTH DISTRICT OFFICE, Town Hall, Germantown.

Purveyor—George W. Bardens.

Clerk—R. M. J. Livezey.

Assistant Clerk—Godfrey Dieter.

General Foreman—Jos. B. Fowler.

Foreman of Repairs—John L. Cameron.

Hydrant Inspector—Samuel Atmore.

SEVENTH DISTRICT OFFICE, Thirtieth and South Streets.

Purveyor—Michael Young.

Clerk—John F. Mahaun.

Assistant Clerk—Jas. S. Ashworth.

General Foreman—Jas. H. Tawney.

Foreman of Repairs—David Anderson.

Watchman—John C. Bishop.

Watchman—Jacob H. Boon.

Telephone Operators.

Jennie M. Hannings,

Calvin Craner.

Permit Clerk—Charles H. Russell.

Assistant Permit Clerk—James S. Van Vranken.

Chief Inspector—Edward Harshaw.

Inspectors.

Wm. A. Agnew,	Harry J. Stone,
Lewis Obermiller,	John A. Brown,
Theo. Yeager,	George W. Eckert,
Jas. Buchanan,	Frank Sloan,
George Crooks,	George Spence,
Henry Homiller,	Hillary Conner,
Wm. J. Reed,	Harrison D. Bates,
Conrad L. Eagle,	Edw. Blum,
George Hoffman,	Thos. G. Morris,
John McGrory, Resigned May 9, 1905.	John T. Gault,
Robt. Crooks, from May 9, 1905.	Robert M. Snyder,
	Chas. W. Wells.

Works--General

Assistant to General Superintendent { Wm. Laumaster. Died, May
12, 1905.
Chas. S. Teal. From Sept.
1, '05.

Assistant Engineer—Fredk. Schaffhauser.

Clerk and Paymaster—Frank Hohlfeld.

Assistant Clerk—John B. Wright.

Foreman Machinist { Robert Bromiley. To June 9, 1905.
Robt. F. Halpin, From Dec. 18, 1905.

Foreman Bricklayer—Jos. F. Ogden.

Foreman Carpenter—Henry Guest.

Foreman Plumber—Chas. H. Green.

Foreman Stonemason—Michael Farrell.

Foreman Painter—Joseph Work.

Foreman Rigger—Lewis Pederson.

Foreman Laborer—Wm. Calhoun.

Foreman of Repairs.

D. H. Rose. To June 15, 1905.

E. N. Sampson.

General Storekeeper { John A. Acker. To June 9, 1905.
Wm. J. Heydrick. From July 18, 1905.

Storekeepers,

Daniel D. Todd,

Wm. F. Glenn.

Electrician—Henry F. Morgan.

Lineman—Edw. J. Cavanaugh.

ANNUAL REPORT
OF THE
BUREAU OF WATER
FOR THE YEAR 1905

NINETEENTH ANNUAL REPORT
OF THE
BUREAU OF WATER

ONE HUNDRED AND FOURTH ANNUAL REPORT
OF
OPERATIONS CONNECTED WITH THE CITY
WATER SUPPLY

Philadelphia, January 19, 1906.

A. LINCOLN ACKER ESQ.,
Director, Department of Public Works.

DEAR SIR:—I have the honor to present herewith my annual report of the work performed by the Bureau of Water during the year ending December 31, 1905:

Revenue Collected.

The total collections during 1905, and the amounts for the several items, as compared with those of the preceding year were as follows :

	1904.	1905.
Water rents	\$3,167,470.53	\$3,264,046.28
Meter rents	290,969.63	272,530.30
Frontage	85,003.76	128,599.68
Amount collected by City		
Solicitor	37,887.35	66,671.66
Penalties	37,993.49	29,176.55
New connections	12,732.00	15,724.00
Searches	2,986.75	3,306.50
Miscellaneous	8,627.62	10,392.29
Totals	\$3,643,671.13	\$3,790,447.26
Total collections 1904		3,643,671.13
Increase in collections 1905		\$146,776.13

Of the above eight items, six show a material increase as compared with the preceding year; those for water rents, frontage and new connections, amounting to \$143,163.67, are principally due to a very great increase in the number of new buildings erected.

There was a decrease of \$18,439.33 in the amount collected for "meter rents," a reduction that is mainly owing to the policy of discontinuing the use of water meters.

The amount collected for "penalties" was 23% less than that during 1904, showing a very great improvement in the financial condition of citizens who ordinarily find it difficult to pay their water tax.

Expenditures.

The expenditures for maintenance, service mains, etc., were	\$945,389.16
Expenditures for improvements and extensions	800,636.55
Total	\$1,746,025.71

Net Earnings of the Bureau of Water.

Total revenue from Water Rents, etc.

Total revenue from water rents, etc.,
from the installation of the water
works, 1799, to December 31, 1905 \$91,232,768.65

Total Expenditures.

Total expenditures for maintenance and
construction, including amounts paid
for improvement, extension and filtra-
tion of the water supply from 1799 to
December 31, 1905 \$72,213,364.19

Net Profit Earned by the Bureau of Water.

Net profit earned by the Bureau of Water
from the installation of the works in
1799 to December 31, 1905 \$19,019,404.46

Consumption.

The total consumption of water during 1905, computed from plunger displacement, was 119,220,042,409 gallons, or at an average rate of 326,630,253 gallons per day.

The average per capita consumption was 227.2 gallons, a decrease, as compared with that of 1904, of 5.9 gallons.

The following table shows the average daily pumpage of water, computed from plunger displacement, from the Delaware and Schuylkill rivers to the several distribution systems named, and the percentage of increase and decrease in the supply to each section :

Distribution Systems.	Average daily pumpage in gallons.	Percentage of increase or decrease compared with 1904.
East Park.....	149,937,508	-3.4
Belmont.....	48,572,767	+7.3
Queen Lane.....	82,665,050	+18.7
Roxborough.....	26,494,869	-5.8
Frankford.....	24,560,564	24.4

As shown above, there was a decrease of 3.4 per cent in the pumpage to the East Park system. This reduction was due to drawing a greater quantity of water than usual from Wentz Farm into the East Park district, and in this manner relieving the pumps at the Spring Garden station, which supply this section with water. By reason of this relief an opportunity presented to shut down the engines to make many important repairs, which increased the efficiency of the pumps, and thereafter less work was required of them to furnish the quantity of water necessary to supply this district.

There was also a decrease in the recorded pumpage to the Frankford district, mainly due to the greater efficiency of the three new 20,000,000 gallon pumps at Lardner's Point pumping station No. 2, as compared with the old engines at Station No. 1.

The increase in the Belmont pumpage was required to meet the greater demands for water in that section, which is rapidly increasing in population.

There was also an increase in the Queen Lane district, where, fortunately, the pumpage was uninterrupted by any serious breakdown of the engines, which, for several years past, has invariably happened, greatly crippling the service.

A similar condition existed at Roxborough, where, during the preceding year, the pumpage was materially checked by the breaking of the Flat Rock dam.

Throughout all the districts the water supply has been much more satisfactory than it has been for a number of years past, especially during the last eight months of the year, when extensive repairs were made to the machinery and its condition thereby considerably improved.

Cost of Pumpage.

The following table shows the cost of pumping 1,000,-000 gallons of water 100 feet high, including all incidental expenses, at the several stations named:

	PUMPAGE FROM RIVERS.		
	1903	1904	1905
Fairmount, water power.....	\$2 48	\$2 78	\$2 56
Spring Garden, steam power.....	5 16	5 07	5 10
Belmont, steam power.....	5 40	5 04	4 48
Queen Lane, steam power.....	3 88	3 61	3 16
Roxborough, steam power.....	6 70	6 99	5 86
Frankford. No. 1, steam power.....	6 98	6 19	13 03
Frankford. No. 2, steam power.....			2 75

Supplemental Pumpage from Reservoirs.

	1903	1904	1905
Belmont High Service, steam power.....	\$12 72	\$14 52	\$11 58
Roxborough High Service, steam power...	9 17	9 61	13 11
Roxboro Annex, Filtration, steam power..	8 68	13 71	14 95
Mt. Airy High Service, steam power.....	221 76	296 46	471 65
Chestnut Hill High Service, steam power..	13,520 65	10,091 48	3,337 42
Wentz Farm High Service, steam power...	216 67	130 08	84 51

From the above it will be seen that there are creditable reductions in the cost of pumpage from rivers, with the exception of that at Frankford station No. 1, which is charged with the total cost of repairs since this station was shut down, in April last.

At the High Service stations, there was a reduction in the cost of pumpage at Belmont, and an increase at Roxborough and Roxborough Annex, due to extensive repairs to boilers and machinery.

The great cost of pumpage at Mt. Airy and Chestnut Hill is owing to the fact that these stations do little work and are practically out of service, except in cases of emergency.

The decrease in the cost of pumpage at Wentz Farm is due to the greater quantity of water pumped.

Improvements Required.

In previous reports I have frequently referred to the importance of increasing the number of boilers and engines at the Belmont and Roxborough pumping stations, and it is satisfactory to state that provision has been made recently to furnish a new boiler house, ten boilers and stack, at the Belmont pumping station. This will enable us to pump sufficient water, with the present engines, to supply all of West Philadelphia with filtered water until such time as arrangements can be made for new engines, an additional pumping main, and an extension to the engine house, as has been previously recommended.

Similar extensions are required at the Roxborough works; also an additional engine at the Belmont and the Roxborough High Service stations, with boilers and extension to the boiler house at the latter station.

I therefore beg to repeat so much of my recommendations of last year as have not yet been provided for, and to recommend the laying of two 16-inch mains in addition, as follows:

Belmont Pumping Station.

Extension to engine house, and three		
10,000,000 gallon pumping engines .	\$200,000	
One 36-inch pumping main	65,000	
	\$265,000	

Belmont High Service Station.

One 5,000,000 gallon pumping engine	\$26,000
---	----------

Roxborough Pumping Station.

New boiler house, 8 boilers and stack	\$ 83,000	
Four (4) 5,000,000 gallon pumping engines	175,000	
Coal shed	55,000	
		<u>\$313,000</u>

Roxborough High Service Station.

Extension to boiler house and two boilers	\$25,000	
One 5,000,000 gallon pumping engine	26,000	\$51,000
One 16-inch supply main: Chew street from Tulpehocken to Haines street; Haines street from Chew street to Limekiln pike		\$23,000
One 16-inch service main: Kensington & Oxford pike, and in Nicetown lane from Tabor road to Fifth street		<u>\$30,000</u>
Totals		\$708,000

Fairmount Dam.

Repairs to this structure were begun in 1904, and the most important part of the work was done during that year. Since then the repairs have been continued, and there now remain only a number of 10 x 10 timbers to be placed on the apron to complete the work. This would also have been done had it not been prevented by high water on the dam.

The expenditure for these repairs, during 1905, was \$6,489.98, which, with the amount expended in 1904, makes the total cost to date \$21,352.78.

Fairmount Station.

The total pumpage at the Fairmount station was 7,031,993,186 gallons, an increase of 66,712,072 gallons:

The cost of pumping 1,000,000 gallons 100 feet high at this station was \$2.56, a decrease of 22 cents per 1,000,000

gallons due to the greater quantity of water pumped, and less expenditures for supplies and repairs to buildings, grounds and reservoirs.

The pumps at this station are all in good condition, with the exception that the plungers are very much worn from long service and require repairs.

The effect of this condition is greater "slip" and less effective work performed by the engines. To make the repairs it will be necessary to renew the bushings in the pump chambers and face, or furnish new plungers, involving considerable expense, which was not deemed advisable in view of the decision of the Board of Experts on the Improvement, Extension and Filtration of the Water Supply of Philadelphia to abandon these works upon the completion of the Torresdale system now under construction.

Spring Garden Station.

The total pumpage at the Spring Garden Station was 47,118,495,831 gallons, a decrease of 3,874,269,469 gallons.

The reduction in the pumpage at this station was due to the completion of three (3) new 20,000,000 gallon pumps at Lardner's Point station No. 2, and the assistance rendered by them in supplying the East Park district.

This assistance permitted the shutting down of the engines at the Spring Garden station one at a time and the making of many important and long-delayed repairs; a work which is still in progress, and, owing to the run-down condition of the pumps, will still require considerable time to complete.

The cost of pumping 1,000,000 gallons 100 feet high at these works was \$5.10, an increase of 3 cents per million gallons.

No. 2 engine requires two new plungers. No. 3 engine

requires general repairs. Both need adjusting. No. 9 is in good condition. No. 10 is undergoing repairs.

At the upper house, all the pumps need numerous minor repairs.

Belmont Station.

The total pumpage at the Belmont station was 15,904,059,987 gallons; an increase of 1,042,353,565 gallons.

This additional quantity represents a legitimate increase in the water supply of West Philadelphia, due to increased pressure on the mains, and more particularly to the rapid growth of population in that section of the city.

I have previously referred to the extensions required at this station, and would urge again that immediate provision be made for the purchase of engines, etc., as recommended. In this connection I would call attention to the fact that during the past year 4,029 new dwellings were erected, beside many other structures in which water is consumed, and nearly 10 miles of service mains were laid, the latter being 33 per cent. of all such work done in the city during the past year.

The completion, in the near future, of the Philadelphia Rapid Transit Co's. lines means still greater demands for water in this section, and the growth of population radiating along the lines of Market street and Baltimore and Lancaster avenues must be provided for at the earliest date possible.

The old engines Nos. 1, 2 and 3 at the Belmont station are in nearly as good condition as it is possible to have them.

Early in the year No. 4 Worthington engine was provided with new air pumps, and it has since been able to pump a limited quantity of water to the Belmont sedimentation basins, but with the higher steam pressure expected from the new boilers, now under contract to be provided at this station, much better results will be obtained.

The three (3) new Holly engines, Nos. 5, 6 and 7, have been doing faithful work throughout the year, although two of the pump chambers on No. 6 engine cracked quite badly last June. These were patched and reinforced, and up to the present time have held together. They are, however, in a precarious condition, and will be replaced at the first opportunity with two new chambers just received.

The cost of pumpage at these works was \$4.48 per 1,000,000 gallons raised 100 feet high, a reduction of 45 cents per 1,000,000 gallons.

Queen Lane Station.

The total pumpage at this station was 26,307,373,490 gallons, an increase of 353,186,440 gallons, or about 1,000,000 gallons per day.

During the past year the engines at this station have been in service day and night 90 per cent. of the possible running time. There has, therefore, been little opportunity afforded in which to make repairs, except such as were absolutely necessary. The result is that these engines need extensive overhauling, and it is daily becoming a more serious matter, owing to the fact that the service of these pumps is required constantly to maintain the supply in the Queen Lane district, whether it will be possible to repair these engines properly until provision has been made to relieve them by supplying part of this district with Torresdale water.

The cost of pumping 1,000,000 gallons 100 feet high was \$3.16, a reduction of 40 cents per 1,000,000 gallons, due to a reduction of all items of expense at this station.

Roxborough Station.

The total pumpage at the Roxborough station was 9,670,444,965 gallons, an increase of 500,891,540 gallons.

The engines and boilers at this station are in fairly good condition, with the exception of a broken actuating cylinder and broken pipe connection on No. 5 engine, castings for which are now being made.

The crippling of an engine, however, does not materially affect the pumpage at this station, for there is not sufficient boiler power to run all the engines satisfactorily at one time.

I have therefore included in the list of extensions, boilers and engines which, like those at Belmont, should be provided for at once.

The cost of pumping 1,000,000 gallons 100 feet high at this station was \$5.86, or \$1.13 per 1,000,000 less than that of the preceding year.

Frankford Station.

The total pumpage at the Frankford station, No. 1, was 2,687,167,224 gallons.

Since April last this station has been out of service, with the exception of two days, when pumpage was resumed while attaching and detaching a Pitot meter from one of the forcing mains from the new station, No. 2.

The first of the three 20,000,000 gallon pumps at the latter station (No. 5 engine) was first started in continuous work in February, and after being tried and adjusted for three months was continued in service, and engines Nos. 6 and 7 followed in order. Those at the old station, No. 1, were then shut down and have since been undergoing extensive repairs.

The total pumpage at the new station, No. 2, was 10,764,087,128 gallons, and the total from the two stations was 13,451,254,352 gallons.

The cost of pumping 1,000,000 gallons 100 feet high at station No. 1 was \$13.03 and at station No. 2 (the new station) \$2.75. Many items in connection with operat-

ing the engines at the latter station were furnished by the contractors and are therefore not charged to the operation of this station.

High Service Stations.

The total pumpage at the High Service stations was 5,883,805,365 gallons, an increase of 88,939,491 gallons.

The increase and decrease at the several High Service stations were as follows:

High Service Stations.	Pumpage.	Increase.	Decrease.
Belmont	881,889,482	607,712	
Roxborough	1,146,922,527		253,378,143
Roxborough Annex	8,652,158,445	166,986,445	
Mt Airy	16,066,500		12,157,250
Chestnut Hill	819,900	555,420	
Frankford	236,448,511	186,325,307	
Totals			

All the engines at the High Service station, excepting No. 2 d'Auria pump at Frankford, are in excellent condition.

Distribution.

The conditions pertaining to this branch of the service are exceedingly unsatisfactory, and in relation thereto I beg to repeat a statement contained in my report for 1904, which is as follows:

“This Bureau has been very much hampered by lack of funds with which to purchase and lay service mains in all parts of the city. Delay in this work is exceedingly annoying to builders, and restricts, instead of encouraging, progress in the development of the suburban sections of the city.

“Ample provision should be made for laying water mains, especially as the money expended for this purpose is more than returned to the city by the amounts collected for frontage charges paid by the owners of property on streets in which water pipes are laid.”

The total quantity of pipe laid for the distribution of water was 159,307 feet, or 47,537 feet in excess of that of the preceding year. There are, however, applications on our books from owners and builders for 86,000 feet and upward of pipe to be laid, and these applications are increasing in number from day to day, in addition to which there are thousands of feet of pipe which must be laid before paving of streets. The City should at least make provision to meet these requirements, and, if possible, provide liberal appropriations to anticipate them.

The total quantity of pipe now in use is 1496.83 miles, and the total number of fire hydrants 14,311.

The total number of meters of all sizes in use is 1735, a decrease of 28 since my last report.

Very respectfully yours,

F. L. HAND,
Chief of Bureau.

Comparison of the Pumpage for the Delaware and Schuylkill Rivers, for 1904 and 1905.

	GALLONS.		GALLONS.	
	1904.	1905.	Increase.	Decrease.
Annual Pumpage:				
From Rivers.....	120,386,160,615	119,488,641,811	.....	902,518,804
High Service.....	5,794,865,874	5,883,805,365	88,939,491	
Total.....	126,181,026,489	125,367,447,176	.....	813,579,313
Maximum Daily Pumpage:				
From Rivers.....	373,311,527	379,532,502	6,220,975	
High Service.....	16,173,881	15,190,496	.....	983,385
Total.....	389,485,408	394,722,998	5,237,590	
Average Daily Pumpage:				
From Rivers.....	328,923,936	327,352,443	.....	1,571,493
High Service.....	15,832,966	16,120,015	287,049	
Total.....	344,756,902	343,472,458	.....	1,284,444
Average Daily Pumpage from Rivers Per Capita.	234	227.7	.....	6.3

*Volume and Cost of Pumpage for the Years 1895 and
1905, Inclusive.*

Year.	Number of Gallons Pumped.†	Number of Gallons Pumped 100 Feet High.†	Cost per Million Gallons Pumped 100 Feet High.	Gallons Pumped Per Capita per Day.	Population Estimated.
1895	78,775,849,104	182,040,954,195	83 69	162	1,329,957
1896	87,693,642,529	161,776,711,713	8 48	172	1,867,815
1897	95,667,466,871	187,371,927,277	8 16	185	1,885,734
1898	102,241,835,372	210,828,629,625	2 97	196	1,400,000
1899	107,991,371,604	231,313,686,728	2 90	199	1,425,000
1900	106,822,576,055	218,119,532,621	8 71	221	*1,293,697
1901	108,805,457,224	210,456,847,513	4 14	211	1,321,304
1902	116,798,424,500	239,698,545,013	4 80	232	1,349,500
1903	124,015,934,669	248,768,806,094	5 20	238	1,378,298
1904	126 181,026,489	251,214,168,044	5 11	234	1,407,690
1905	125,367,447,176	261,281,445,628	4 61	227.7	1,437,730

* United States Census.

† Including Repumpage or High Service.

*Cost of Raising 1,000,000 Gallons 100 Feet During
1904 and 1905.*

Pumping Station.	1904.	1905.	Increase.	Decrease.
Fairmount	\$2 78	\$2 56	.....	\$0 22
Spring Garden	5 07	5 10	\$0 03	
Belmont	5 04	4 48	.....	56
Queen Lane	8 61	8 16	.....	45
Roxborough	6 99	5 86	.....	1 13
Frankford, No. 1	6 19	18 03	6 84	
Frankford, No. 2.....	.....	2 75	2 75	
Average	\$4 98	\$4 42	.....	\$0 51
High Service Stations.				
Belmont	\$14 52	\$11 53	.....	\$2 99
Roxborough	9 61	13 11	\$3 50	
Roxborough Annex	13 71	14 95	1 24	
Mt. Airy	296 46	471 65	175 19	
Chestnut Hill*	10,091 48	3,337 42	.....	6,754 06
Frankford	130 08	34 51	.....	95 57
Average	\$16 99	\$17 19	\$0 20	
Total average	\$5 11	\$4 61	.....	\$0 50

* This Station is practically out of service.

Comparison of the Nominal, Maximum, Minimum and Average Daily Pumpage for 1904 and 1905.

PUMPING STATIONS.	NOMINAL.		MAXIMUM.		MINIMUM.		AVERAGE.	
	1904.	1905.	1904.	1905.	1904.	1905.	1904.	1905.
Fairmount.....	33,290,000	33,290,000	84,570,400	84,173,206	496,650	1,060,520	10,030,823	19,265,734
Spring Garden.....	170,000,000	170,000,000	154,597,230	151,322,170	98,650,890	74,127,560	189,324,495	129,091,769
Belmont.....	65,500,000	65,500,000	52,313,760	53,888,340	6,673,480	20,751,800	40,605,755	43,572,768
Queen Lane.....	80,000,000	80,000,000	80,506,050	70,274,650	41,338,150	37,086,100	70,013,134	72,075,051
Roxborough.....	35,500,000	35,500,000	32,064,095	31,761,135	11,793,725	15,657,385	25,053,425	26,494,360
Total from Schuylkill.....	384,290,000	384,290,000	354,551,544	350,419,501	158,961,895	154,691,315	291,927,632	290,400,601
Increase.....								
Decrease.....				4,182,043		4,270,580		4,427,941
Frankford, No. 1.....	57,000,000	57,000,000	43,601,620	39,363,180	17,045,790	2,517,900	33,096,304	7,362,103
Frankford, No. 2.....		60,000,000		42,005,880		1,233,585		29,490,640
Total from Delaware.....	57,000,000	117,000,000	43,601,620	81,369,060	17,045,790	3,751,485	33,096,304	36,852,752
Increase.....		60,000,000		37,767,440				
Decrease.....						13,294,305		2,856,448
Totals from Delaware and Schuylkill...	441,290,000	501,290,000	398,153,164	431,788,561	176,007,685	158,442,800	328,023,936	327,352,443
Increase.....		60,000,000		33,635,397				
Decrease.....						17,564,885		1,571,493

Comparison of the Nominal, Maximum, Minimum and Average Daily Pumpage, etc.—Continued.

HIGH SERVICE STATIONS.	NOMINAL.		MAXIMUM.		MINIMUM.		AVERAGE.	
	1904.	1905.	1904.	1905.	1904.	1905.	1904.	1905.
	Belmont	7,000,000	7,000,000	2,341,440	2,334,800	1,153,440	1,341,440	2,269,895	2,277,779
Roxborough	10,000,000	10,000,000	5,113,485	3,927,450	2,849,280	2,448,440	3,825,958	3,142,253
Roxborough Annex	30,000,000	30,000,000	14,700,000	12,950,000	7,080,000	7,180,000	9,522,328	10,005,915
Mt. Apy	3,000,000	3,000,000	2,160,000	1,170,000	45,000	90,000	77,114	44,018
Chestnut Hill	750,000	750,000	132,240	275,520	132,240	2,400	723	2,246
Frankford	7,000,000	7,000,000	2,407,737	2,864,373	85,176	70,920	136,948	647,804
Total High Service	57,750,000	57,750,000	26,944,902	24,122,143	11,345,136	11,151,200	15,882,966	16,120,015
Total Daily	499,040,000	559,040,000	425,098,066	455,010,704	187,352,821	169,594,000	344,756,902	348,472,458
Increase		60,000,000		30,812,638				
Decrease						17,758,821		1,284,444

The following appendices accompany this report :

- A. Report of Chief Clerk.
- B. Report of General Superintendent.
- C. Report of Assistant in Charge of Distribution.
- D. Report of Superintendent of Construction and Repair Shop.
- E. Report of Chief Draughtsman.

APPENDIX A.

REPORT OF CHIEF CLERK

Philadelphia, January 15, 1906.

MR. F. L. HAND,
Chief, Bureau of Water.

DEAR SIR:—I have the honor to transmit, herewith, a detailed statement of the expenditures of the Bureau from the appropriation made directly thereto, an itemized list of miscellaneous receipts and a table of the revenues derived from the operations of the Bureau during the year 1905.

A statement taken from the books of the City Controller shows the amounts expended for supplies by the Department created for the purpose.

Yours respectfully,

J. T. HICKMAN,
Chief Clerk.

Detailed Expenditures of the Bureau, for 1905.

General Appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
An Ordinance to make an appropriation to the Bureau of Water approved..				
Dec. 31, 1904.....	\$651,193 00			
Balance from books of 1904.....	1,034,639 60			
Increased by transfers.....	40,312 61			
	\$2,015,145 21			
Diminished by transfers.....	41,548 41			
Net appropriations.....		\$2,893,601 80		
Item 1.—Salaries... ..	\$414,893 00			
Diminished by transfer.....	27,000 00			
Net Appropriation.....		\$87,893 00		
Chief of Bureau.....	6,000 00	\$6,000 00		
Chief clerk.....	2,000 00	2,000 00		
Assistant clerk.....	1,200 00	1,200 00		
Correspondence clerk.....	900 00	900 00		
Time clerk.....	1,000 00	1,000 00		
Messenger.....	720 00	698 57		
Draughtsmen.....	7,200 00	7,067 50		
General superintendent.....	3,500 00	3,500 00		
Assistant to general superintendent.....	1,000 00	709 60		
Assistant engineer.....	1,000 00	1,000 00		
Clerk and paymaster.....	1,100 00	1,100 00		
Assistant clerk.....	900 00	900 00		
Assistants to chief.....	3,600 00	3,600 00		
Pipe inspector and clerk.....	2,200 00	2,200 00		
Search clerks.....	2,200 00	2,200 00		
Assistant clerks.....	3,650 00	3,650 00		
Chief inspector.....	1,200 00	1,200 00		
Inspector.....	22,000 00	21,560 05		
Permit clerks.....	2,300 00	2,300 00		
Purveyors.....	10,680 00	10,064 85		
Clerks to purveyors.....	5,600 00	5,384 10		
Purveyors' assistant clerk.....	5,250 00	5,173 05		
Hydant inspectors.....	7,050 00	7,050 00		
General foreman.....	7,573 00	7,125 17		
Foremen of repairs.....	7,020 00	6,563 95		
Superintendent of shop.....	1,500 00	1,500 00		
Clerk to superintendent of shop.....	900 00	785 00		
Watchmen, offices and yards.....	6,075 00	5,852 22		
Storekeepers.....	1,600 00	1,600 00		
Foreman machinist.....	1,800 00	862 74		
Foreman bricklayer.....	1,400 00	1,400 00		
Foreman carpenter.....	1,100 00	1,100 00		
Foreman plumber.....	1,000 00	1,000 00		
Foreman stonemason.....	900 00	900 00		
Foreman painter.....	900 00	900 00		
Foreman flogger.....	900 00	900 00		
Foreman laborer.....	840 00	840 00		
Janitor, main office.....	720 00	720 00		
Linemen.....	1,000 00	1,000 00		
Telephone operators.....	1,320 00	1,300 00		
Electrician.....	1,200 00	1,200 00		
General storekeeper.....	1,000 00	879 84		
Yardman, fourth district.....	915 00	904 83		

Detailed Expenditures of the Bureau—Continued.

General Appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 1.—Continued.				
Salaries of Pumping Stations:				
Fairmount	\$12,510 00	\$11,614 04		
Spring Garden	81,120 00	78,295 80		
Belmont	33,900 00	31,103 88		
Belmont High Service	7,250 00	6,248 61		
Queen Lane	40,020 00	36,358 17		
Roxborough	32,840 00	28,137 53		
Roxborough High Service	10,440 00	10,167 98		
Mt. Alry	4,620 00	4,571 29		
Chestnut Hill	2,550 00	2,550 00		
Frankford	47,200 00	36,991 64		
Frankford High Service	8,350 00	7,787 33		
Uniforms for policemen and watchmen	1,680 00	1,560 00		
Total		\$383,795 92	\$4,097 08	
Item 2. For wages of mechanics, laborers and other workmen employed upon repairs to machinery, and the maintenance and repairs to buildings, grounds and reservoirs, and the transportation of workmen incident thereto.....				
	\$190,000 00			
Diminished by trans.	9,000 00			
Net appropriation.....	\$181,000 00			
Bricklayers		\$15,027 21		
Carpenters		8,641 60		
Helpers		7,455 54		
Horses, carts and drivers		2,493 21		
Laborers		9,172 47		
Machinists		35,458 66		
Painters		4,446 12		
Stonemasons		4,409 91		
Stop attendant		991 87		
Transportation		5,921 09		
Total		\$180,997 69	\$2 31	
Item 3. For wages of mechanics, drillers, laborers and other workmen connected with repairs to and improvement of the distribution; the buying of service mains; the transportation of workmen engaged in repairs, and the travelling expenses of pipe inspectors.....				
	\$260,000 00			
Increased by trans.	21,530 61			
Net appropriation.....	\$281,530 61			
Transportation		\$2,390 00		
Travelling expenses		524 71		

Detailed Expenditures of the Bureau—Continued.

General Appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 3.—Continued.				
Wages:				
Improvement.....		\$38,001 74		
First district.....		28 276 89		
Second district.....		21,602 29		
Third district.....		81,627 90		
Fourth district.....		22,308 61		
Fifth district.....		23,861 84		
Sixth district.....		31,799 45		
Seventh district.....		29,996 17		
Total.....		\$280,389 60	\$1,141 01	
Item 4. For wages of mechanics, helpers and other workmen at the City construction and repair shop....				
\$34,000 00				
Increased by trans.	2,700 00			
	\$36,700 00			
Diminished by trans.	300 00			
Net appropriation	\$36,400 00			
Wages.....		\$36,004 43	\$395 57	
Item 5. For wages of hydrographic corps and expense incident thereto....				
\$1,000 00				
Diminished by trans.	4 00			
Net appropriation.....	\$1,96 00			
Wages.....		\$1,596 00		
Item 6. For repairs to boilers.....				
\$15,000 00				
Increased by transfer.	3,000 00			
Net appropriation	\$18,000 00			
Fairmount		\$12 44		
Mt. Airy		12 60		
Frankford high service.....		71 23		
Belmont high service.....		116 01		
Shop		186 70		
Roxborough high service.....		282 92		
Frankford.....		675 10		
Belmont		3,115 68		
Roxborough		3,184 18		
Queen Lane		3,660 73		
Spring Garden.....		6,681 30		
Total.....		\$17,999 39	\$0 61	
Item 7. For hauling water pipe and machinery.....				
\$5,000 00				
Increased by transfer.	2,000 00			
Net appropriation.....	\$7,000 00			
Hauling.....		\$5,036 43	\$1,963 57	

Detailed Expenditures of the Bureau—Continued.

General Appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 8. For repairs to roofs	\$2,500 00			
Mt. Airy		38 40		
Roxborough high service		8 40		
Sixth district		14 00		
First district		16 80		
Belmont high service		50 80		
Third district		33 60		
Queen Lane		72 80		
Fairmount		84 00		
Frankford		92 40		
Shop		120 40		
Belmont		165 20		
Roxborough		184 80		
Spring Garden		1,234 80		
Total		\$2,066 40	\$433 60	
Item 9. For clerk hire in writing up duplicates	\$2,500 00			
Diminished by trans.	39 41			
Net appropriation	\$2,460 59	\$2,460 59		
Item 10. For keep of horse for chief of bureau, general superintendent and assistant, four hundred (400) dollars each.		1,200 00	1,200 00	
Item 11. For advertising, postage, horseshoeing, miscellaneous expenses, repairs to wagons, carts, harness, tools, pipes, pavements, etc., ground rent of No. 918 Cherry st., rent of office, shop and stables, 5th district, electric current, etc.	\$4,000 00			
Increased by transfer ..	3,000 00			
Net appropriation	7,000 00			
Advertising		136 00		
Badges		22 00		
Brazing		10 00		
Brush		2 50		
Care of clocks		24 50		
Diaphragms		25 50		
Electric current		880 18		
Electric supplies		70 85		
Exploders		2 25		
Freight		12 89		
Furnishing meals		204 80		
Ground rent		26 66		
Gun goods		17 25		
Hardware		15 65		
Hire of roller		12 00		
Horseshoeing		1,401 91		
Incidentals, hydrographic corps		85 70		
Machine work		13 12		
Maps		404 00		
Parts of meters		147 34		
Plants		121 15		

Detailed Expenditures of the Bureau—Continued.

General Appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 11.—Continued.				
Plumbing		\$91 27		
Postage		235 50		
Printing, binding, etc.		110 72		
Professional services, V. S. .		157 0-		
Repairs to bags		19 00		
Repairs to copper pipe, etc. .		114 15		
Repairs to fan		4 10		
Repairs to harness		813 75		
Repairs to hoist		19 65		
Repairs to locks		9 25		
Repairs to pumps		98 25		
Repairs to scales		178 10		
Repairs to telephones		22 40		
Repairs to waxons		1,057 38		
Rent of fire extinguishers ..		90 00		
Rent of disinfectors		144 00		
Rent of office and shop		104 00		
Rent of stable		98 00		
Serving morning papers		15 00		
Subscription		38 00		
Sundry repairs		159 90		
Table		7 50		
Telegrams		2 60		
Testing machine		61 65		
Text books		15 20		
Transportation		50 00		
Typewriter supplies		9 05		
Washing towels		18 00		
Total		\$6,991 96	\$8 64	
Item 12. For asphalt and granolithic paving and repairs thereto				
\$500 00				
Diminished by trans.	500 00			
Item 13. For emergencies				
5,000 00				
Increased by trans.	9,000 00			
	\$14,000 00			
Diminished by trans.	3,000 00			
Net appropriation	\$11,000 00			
Air compressors		\$390 00		
Coal cars		390 00		
Cotton waste		31 53		
Repairs to engines		4,693 17		
Repairs to sidings		78 58		
Services of diver		230 00		
Supporting tracks		312 86		
Total		\$6,126 14	\$2,053 86	\$2,820 00
Item 14. For hauling ashes from Spring Garden, Queen Lane and Belmont Pumping Stations				
\$12,500 00				
Diminished by trans.	700 00			

Detailed Expenditures of the Bureau—Continued.

General Appropriation.	Amount appropriated.	Amount expended.	Amount merging.	Amount not merging.
Item 14.—Continued.				
Net appropriation ..	\$11,800 00			
Queen Lane.....		\$2,500 00		
Belmont.....		2,800 00		
Spring Garden.....		6,500 00		
Total.....		\$11,800 00		
Item 15. For the purchase of material connected with the repairs to machinery, mains, buildings and sidings.....				
Increased by trans.	\$2,500 00			
	2,500 00			
	<u>\$5,000 00</u>			
Diminished by trans.	1,000 00			
Net appropriation.....	\$4,000 00			
Brass fittings.....		\$1,950 47		
Boiler cleaners.....		160 75		
Boiler covering.....		12 00		
Cement.....		8 55		
Gum goods.....		1 05		
Hardware.....		311 44		
Heavy syrup.....		5 50		
Iron fittings.....		258 70		
Lumber.....		61 72		
Parts of meters.....		55 80		
Purifier.....		125 00		
Top dressing.....		10 25		
Wheels for tool-box.....		65 00		
Total.....		\$2,435 23	\$1,564 77	
Item 16. Sand for filtration purposes.....				
Balance January 1.....	\$332,380 00	\$45,857 50		\$286,522 50
Item 16½. Sand for filtration purposes, Torresdale beds.....				
Balance January 1.....	200,000 00			200,000 00
Item 17. Improvement, extension and filtration of the water supply.....				
Balance January 1.....	10,500 49			
Electric plant, Belmont filters.....		2,136 48		
Inspecting.....		88 50		
Wages (Bureau of Water).....		495 92		
Total.....		\$2,720 90		\$16,788 50
Item 18. Filtration.....				
Balance Jan. 1.....	\$850,708 42			
Increased by trans.	5,582 00			
Net appropriation.....	\$856,380 42			
Electric plant, Roxborough.....		\$783 00		

Detailed Expenditures of the Bureau—Continued.

General Appropriation.	Amount appropriated.	Amount expended	Amount merging.	Amount not merging.
Item 18.—Continued.				
Oak Lane reservoir.....		\$58,639 87		
Preliminary filters, Roxborough.....		49,600 00		
Pumping engines (Frankford).....		106,806 99		
Pumping station (Frankford).....		88,884 04		
Traveling expenses (Inspector).....		115 05		
Torresdale conduit.....		119,492 78		
Torresdale filters.....		125,187 28		
Wages, Bureau of Water.....		787 85		
Wages, Bureau of Filtration.....		885 57		
Total.....		\$551,272 48		\$905,107 99
Item 19. High pressure fire service.				
Balance, January 1.....	\$617 37			\$617 37
Item 20. Furnishing and laying mains.				
Balance, January 1.....	519,330 57	\$200,785 72		\$318,558 85
Item 21. Repairs Fairmount dam.				
Balance, January 1.....	11,994 75	6,489 98		\$5,504 77

*Statement of the Amount Expended by the Department of
Supplies for this Bureau, During the Year 1904.*

Taken from the Books of the City Controller.	Amount Appropriated.	Amount Expended.	Amount Merging.
Item 16. For stationery, engineer supplies, etc.....	\$6,000 00	\$5,613 30	\$386 70
Item 17. For coal.....	683,881 00	667,971 39	15,909 00
Item 18. For oil, lubricants, paints, etc.	11,200 00	9,925 25	1,274 75
Item 19. For iron water pipe, lead, etc.	100,000 00	97,739 94	2,260 06
Item 20. For hardware, bolts, castings, etc.....	32,000 00	27,240 02	4,759 98
Item 21. For gum goods and packing..	23,500 00	22,254 49	1,245 51
Item 22. For chandlery.....	6,000 00	5,768 63	231 37
Item 23. For wrought iron pipe and fittings.....	5,000 00	4,313 22	686 78
Item 24. For fire brick and clay.....	1,960 00	1,094 70	865 30
Item 25. For brass fittings and castings	12,000 00	11,843 53	156 47
Item 26. For covering for boilers and pipes.....	600 00	238 46	361 54
Item 27. For lumber.....	14,000 00	13,803 50	196 50
Item 28. For forage.....	5,700 00	5,403 04	296 96
Item 29. For iron and steel.....	2,500 00	2,086 38	413 62
Item 30. For cement, bricks, lime, sand, etc.....	8,000 00	7,427 71	572 29
Item 31. For electrical supplies.....	1,450 00	1,026 85	423 15
Item 32. For granite curb and coping stone.....			
Item 33. For tapping and pipe cutting machines.....	1,200 00	1,186 80	13 20
Item 34. For horses, wagons, harness, etc.....	3,000 00	2,570 09	429 91
Item 35. For donkey pumps, machine tools, etc.....	2,500 00	1,890 00	610 00
Item 36. For special articles.....	3,000 00	2,290 49	709 51
Item 37. For lead pipe, block tin, etc...	6,000 00	4,069 42	1,930 58
	\$920,491 00	\$896,657 21	\$32,833 79

Recapitulation.

RECAPITULATION.			
Balance from books of 1904.....	\$1,034,630 60		
Additional by transfer.....	40,312 61		
Annual appropriation.....	951,193 00		
Appropriation to the Department of Supplies for Bureau of Water.....	929,401 00		\$3,864,636 21
Expended for filtration.....	\$800,636 55		
Expended for maintenance.....	945,380 16		
Expended for supplies.....	806,657 21	\$2,642,682 92	
Amount merging.....	\$11,661 02		
Amount merging, Department of Sup- plies.....	32,833 79		
Transferred.....	41,543 41		
Amount not merging.....	1,135,915 07	\$1,221,953 29	\$3,864,636 21

List of Miscellaneous Receipts for the Year 1905.

Jan. 10	Berry & Aikens	.....Empty oil barrels ..	\$ 266.48
14	Penna. R. R. Co.	.....Cutting off 6-inch water pipe	27.25
16	Adams Express Co.	..No. 2 Fire Hydrant ..	36.63
20	Rapid Transit Co.	...6-inch pipe	28.08
20	Rapid Transit Co.	...6-inch connection on No. 2 Fire Hydrant	29.81
20	Rapid Transit Co.	...6-inch pipe	26.19
23	Bureau of Water	....Overdrawn warrant	20.24
31	Bureau of Water	....Overdrawn warrant	11.37
31	Phila. & R. Ry. Co.	..Turning off water ..	3.18
Feb. 2	Penna. R. R. Co.	.....8-inch pipe	46.88
10	Henry Holmes & Sons	Ludlow Stop	19.15
18	Henson & Pierson	..No. 1 Fire Hydrant..	33.44
20	Rapid Transit Co.	...Raising 12-in. Public Building main ..	593.60
Mar. 11	Penna. R. R. Co.	....6-in. stop on fire con- nection	5.01
14	Terminal Warehouse and Transfer Co.	....No. 1 Fire Hydrant .	30.79
15	G. H. Clamer	.....New wooden stop box	8.07
28	S. B. & B.M. Fleisher	Scrap brass and lead dross	2,188.15
Apr. 6	Reiger & Gretz	.....No. 1 Fire Hydrant .	24.33
12	N. America Lace Co.	..6-in. stop on fire con- nection	5.19
15	McCormick & Co.	...6-inch main	20.51
24	Thomas H. Bowman	..6-inch pipe	24.36
28	J. H. Loucheim & Co.	Pipe on fire hydrant	19.58
May 2	Betz & Sons	.....4-inch stop on private connection	7.82
9	United Gas Co.	.....10-inch pipe	51.05
13	J. H. Deehan & Co.	....Shutting off water ..	34.74
23	Rapid Transit Co.	...Removing fire hy- drant	8.88
23	Rapid Transit Co.	...10-inch pipe	22.02
23	Rapid Transit Co.	...Lowering 6-in. main .	36.11
23	Rapid Transit Co.	...Lowering 6-in. fire hy- drant	25.31
23	Rapid Transit Co.	...Lowering 6-in. private connection	25.32
23	Rapid Transit Co.	...Shifting 12-in. main..	222.72

List of Miscellaneous Receipts—Continued.

May 24	D. McMahon	Shutting off on account of blasting for sewer	19.26
24	D. McMahon	Repairing break in 6-inch main	29.04
June 2	M. J. Hogan & Co.	Repairing break in 6-inch main	9.91
2	Richard Bennis	Repairing break in 6-inch main	7.50
8	Nixon & Zimmerman	Renewing stop box on private supply connection	5.13
21	Rapid Transit Co.	Raising 10-in. pipe	46.27
21	Rapid Transit Co.	Shifting 12-inch Public Building main	274.28
21	Rapid Transit Co.	Shifting 12-inch Public Building main	428.74
21	Rapid Transit Co.	Repairing 6-in. main	41.75
21	Rapid Transit Co.	Shifting 12-inch Public Building main	23.65
July 13	Midvale Steel Co.	Repairing 6-in. stop	3.94
14	Wm. Sellers & Sons.	Location of No. 1 Fire Hydrant	20.52
18	Bureau of Water	Overdrawn warrant	8.25
21	Rapid Transit Co.	4-inch Smith's Patent Stop	5.68
21	Rapid Transit Co.	Raising 6-inch pipe	30.29
21	Rapid Transit Co.	Lowering 6-in. pipe on No. 1 Fire Hydrant	18.86
21	Rapid Transit Co.	Shifting pipe	51.69
21	Rapid Transit Co.	Shifting pipe	82.34
21	Rapid Transit Co.	Shifting pipe	28.60
21	Rapid Transit Co.	Changing location of No. 1 Fire Hydrant	47.97
21	Rapid Transit Co.	Public Building main	193.40
21	Rapid Transit Co.	Removing 6-inch stop	47.82
21	Rapid Transit Co.	Removing 6-inch stop	48.26
21	Rapid Transit Co.	Shifting 3-way stop	19.98
21	Rapid Transit Co.	Changing 6-in. stop	29.21
21	Rapid Transit Co.	Shifting 6-inch stop	23.97
21	J. F. McNichol	Drawing ½ in ferrule	1.06
26	D. J. McNichol	Lowering 12-inch pipe	12.75

List of Miscellaneous Receipts—Continued.

Jun.28	Adams Express Co...	Removing No. 1 Fire Hydrant	9.10
Aug.11	Penna. R. R. Co.....	Repairing 4-inch pipe	11.00
14	Bldwn Locomtve Wks.	Fire Hydrant nozzle	1.32
19	Harmer & Quinn	6-inch pipe	52.77
21	Phila. Freezing Co....	Testing 2-inch meter.	2.00
21	Delaw're Freezing Co.	3-inch stop	6.87
21	Consolidated Ice Co..	No. 2 Fire Hydrant .	37.25
21	American Ice Co.	No. 1 Fire Hydrant .	12.75
21	Rapid Transit Co. ...	10-inch pipe	50.43
21	Rapid Transit Co. ...	10-inch pipe	525.87
21	Rapid Transit Co. ...	Cutting and connect- ing pipe	96.37
21	Rapid Transit Co. ...	Changing location of 3-way stop	29.11
22	Holmes Mfg. Co.	4-inch stop (repair- ing)	7.98
24	A. F. O'Connell	6-inch pipe to supply Fountain, Logan Sq.	239.82
24	S. S. Fritz Mfg. Co. ...	Renewing stop on fire hydrant	37.56
25	S. E. Moore	Renewing No. 1 Fire Hydrant	12.22
25	Edison Electric Light Co	Repairing 6-in. main.	70.29
28	Phila. & R. Ry. Co. ...	Relaying 20-in. main.	1,396.08
31	Howard E. Ruch	Repairing 6-inch main	9.55
31	Howard E. Ruch	2½ in. ferrule	1.56
31	Howard E. Ruch	Repairing 6-in. main	1.81
31	Howard E. Ruch	Repairing 6-in. main.	50.87
31	Am. Cold Strge Ice Co	Fire Hydrant	38.12
Sept. 1	Rapid Transit Co. ...	Repairing main	51.42
8	Wm. Sellers & Co. ...	Changing location of No. 2 Fire Hydrant	40.78
8	Unjted Gas Imp. Co..	Repairing 6-inch main	21.11
16	Geo. W. Ruch & Co..	Repairing 6-inch main	75.04
21	Rapid Transit Co. ...	Breaking 6-inch pipe	13.70
21	Rapid Transit Co. ...	Shifting 10-in. pipe..	64.98
21	Rapid Transit Co. ...	Shifting 10-in. pipe	112.51
21	Rapid Transit Co. ...	Shifting 10-in. pipe..	67.32
21	Rapid Transit Co. ...	No. 2 Fire Hydrant..	42.39
21	Rapid Transit Co. ...	Lowering 10-in. pipe.	48.50
21	Rapid Transit Co. ...	Lowering 10-in. pipe.	36.07

List of Miscellaneous Receipts—Continued.

Sep. 21	Rapid Transit Co.	Moving 4-in. stop	17.54
21	Rapid Transit Co. ...	Shifting 4-in. pipe ...	17.45
21	Rapid Transit Co. ...	Moving 12-inch stop.	45.28
21	Rapid Transit Co. ...	Removing 4-inch stop	4.85
21	Rapid Transit Co. ...	Removing 12-in. stop	52.95
21	Rapid Transit Co. ...	Removing No. 2 Fire Hydrant	7.25
21	Rapid Transit Co. ...	Putting on 12-in. by- pass connection....	90.56
21	Rapid Transit Co. ...	Shifting 10-inch pipe.	192.69
21	Rapid Transit Co. ...	Shifting 10-in. pipe...	163.54
21	Rapid Transit Co. ...	Repairing 6-in. main.	21.49
21	Rapid Transit Co. ...	Raising 6-in. pipe....	35.86
21	Rapid Transit Co. ...	Changing location of No. 1 Fire Hydrant	34.22
21	Rapid Transit Co. ...	Changing location of 6 and 8 in. water main	88.60
21	Rapid Transit Co. ...	Shifting 6-in. W. D. Stop	85.04
21	Phila. Electric Co. ...	Removing 6-in. stop.	14.89
21	Phila. Electric Co. ...	Putting on 8-in. sup- ply main	147.59
21	Hermann Bakery	Changing location of Fire Hydrant	27.97
22	Hoffman Eng. Co. ...	12-inch pipe	96.07
28	Peoples Bros.	Shifting 6-inch pipe..	60.44
29	Wm. McCoach	Putting on 6-inch sup- ply connection	10.75
Oct. 10	Robt. H. Foerderer ..	4-inch stop	1.68
10	Bureau of Water ...	Overdrawn warrant .	25.42
12	Keystone Watch Case Co	Putting in stop box .	4.59
14	Robert Higgins	Cutting out 12-in. main	8.91
14	Ellis Mitchell	Removing No. 1 Fire Hydrant	36.28
17	H. L. Kerbaugh, Inc.	Removing No. 1 Fire Hydrant	8.33
20	Rapid Transit Co. ...	Shifting 8-inch stop..	33.38
Nov. 4	Bureau of Water ...	Overdrawn warrant .	7.75
15	David McMahon	Cutting off pipe	2.82
17	Midvale Steel Co. ...	Changing location of 6-inch meter	8.25

List of Miscellaneous Receipts—Continued.

Nov. 20	Rapid Transit Co.	Changing location of No. 1 Fire Hydrant	58.98
21	Rapid Transit Co. ...	8-inch pipe	40.24
21	Horace Brock	Removing No. 1 Fire Hydrant	28.47
23	Penna. R. R. Co.	Repairing stop	2.55
24	Penna. R. R. Co.	Repairing 4-in. con- nection	10.63
Dec. 8	Robert Higgins	12-inch pipe	15.88
12	D. J. McNichol	Removing 6-inch pipe	8.19
12	D. J. McNichol	Removing 2-inch con- nection	13.64
12	D. J. McNichol	Removing 6-inch main	27.38
20	Frank Hess	Changing location of No. 1 Fire Hydrant	23.16
20	Rapid Transit Co.	Removing 6-inch pipe	38.67
26	D. J. McNichol	Repairing 2-inch main	5.79
28	Jos. G. Conklin	Repairing 8-inch main	17.37
29	Clifford Hewitt	Repairing pr'vt meter	1.00
		Total	\$10,392.29

Receipts from Operations of the Bureau of Water as Reported by the Receiver of Taxes.

1905.	Schedule Rates.	Penalties.	Delinquent.	Penalties.	New Connections.	Meters, Current and Delinquent.	Ferrules, New Connections.	Searches.	Pipe Frontage.	Specials.	Collected by City Solicitor.	Totals.
January			\$7,568 55	\$1,050 19	\$2,056 55	\$5,551 42	\$288 00	\$202 50	\$4,06 75	\$440 23	\$1,080 78	\$23,502 97
February	\$186,209 70		2,616 00	309 02	2,528 95	20,243 58	168 00	201 75	7,570 76	693 07	2,873 97	232,504 80
March	274,219 31		15,442 40	2,331 91	7,131 85	24,903 53	985 00	208 00	10,720 75	2,243 02	5,657 52	343,042 20
April	301,515 70		3,714 00	527 23	7,198 37	3,240 75	1,337 00	311 75	13,197 36	93 97	9,113 85	340,288 98
May	2,043,112 98		2,268 50	342 10	11,138 40	49,458 82	1,541 00	358 25	12,162 27	482 27	5,283 97	2,126,148 56
June	63,017 55	\$2,795 45	887 50	133 15	7,744 04	19,716 09	1,543 00	317 75	5,422 33	837 23	1,957 61	104,371 70
July	34,956 50	1 785 22	1,000 00	122 64	6,265 55	4,630 41	1,512 00	265 00	4,654 03	683 69	1,123 81	56,995 85
August	97,228 05	4,921 58	667 50	118 06	4,951 14	59,567 34	1,207 00	232 25	5,720 31	2,691 60	1,156 98	178,471 76
September	31,584 20	4,339 51	1,637 50	250 26	3,447 78	5,376 79	1,858 00	271 00	13,039 67	1,788 85	2,581 53	66,125 09
October	22,251 36	2,307 19	1,366 00	209 40	3,295 70	4,776 56	2,061 00	305 75	15,332 43	118 59	27,241 90	130,205 88
November	21,079 55	3,063 43	1,034 50	145 03	2,546 93	41,087 16	2,133 00	271 00	19,969 86	159 69	3,597 85	95,088 00
December	27,478 45	4,107 96	1,452 25	218 22	3,395 97	24,068 85	1,601 00	271 50	16,104 16	151 08	4,441 94	83,681 88
Total, 1905	\$3,162,683 35	\$23,320 84	\$30,664 70	\$5,856 21	\$61,698 23	\$272,530 30	\$15,724 00	\$3,306 50	\$128,509 68	\$10,392 29	\$66,671 66	\$3,710,447 26
Total, 1904	3,077,438 43	32,539 27	36,607 50	5,454 22	53,424 60	290,969 63	12,732 00	2,986 75	85,003 76	8,627 62	37,887 35	3,643,671 13
Increase	\$85,244 92		\$3,057 20	\$401 99	\$8,273 63		\$2,992 00	\$319 75	\$43,505 92	\$1,764 67	\$28,784 31	\$146,776 13
Decrease		\$9,218 93				\$18,439 83						
Net Increase												\$119,117 87

APPENDIX B.

REPORT

OF THE

GENERAL SUPERINTENDENT

SUBMITTING

TABLES OF EXPENSES, PUMPAGE AND CON-
SUMPTION OF WATER DURING 1905.

Philadelphia, January 19, 1906.

F. L. HAND, ESQ.,

Chief, Bureau of Water.

DEAR SIR:—I have the honor to submit the following report of operations and expenses in connection with the work performed at the several pumping stations during 1905:

There has been a decrease in the pumpage from the Delaware and the Schuylkill rivers averaging 1,658,822 gallons per day, and a decrease of 4,218 tons in the quantity of coal consumed.

The price of coal averaged 26 cents per ton less than that in the preceding year, which, together with reduction in quantity consumed, represents a decreased expenditure during 1905 of \$70,603.04.

The total reduction of all expenses at the river pumping stations was \$79,928.40.

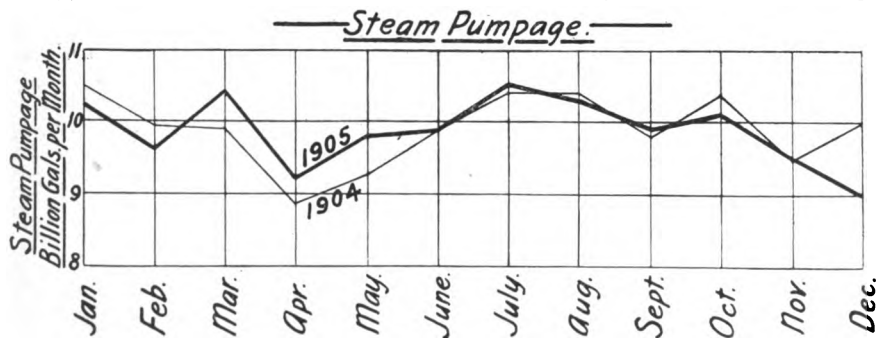
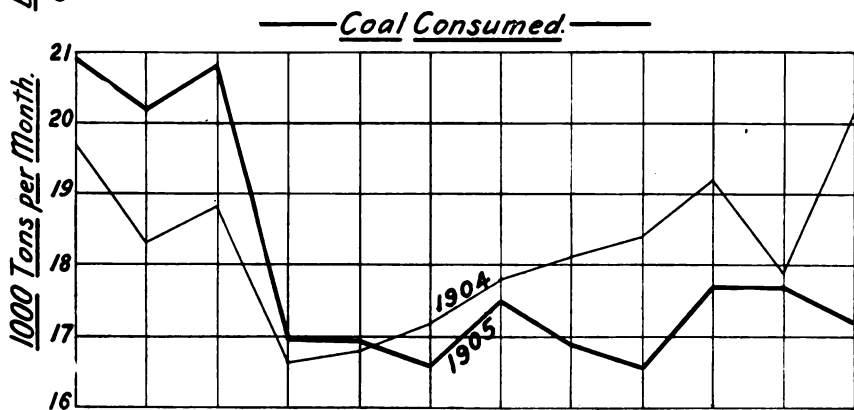
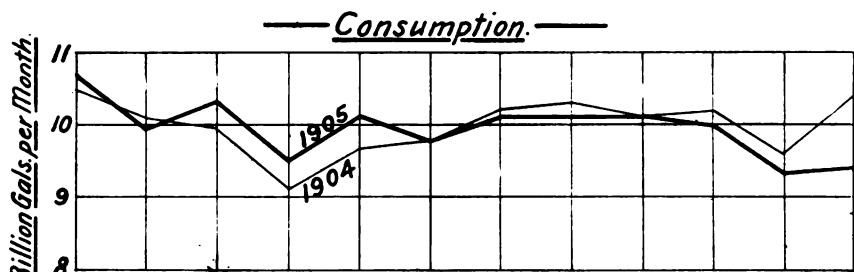
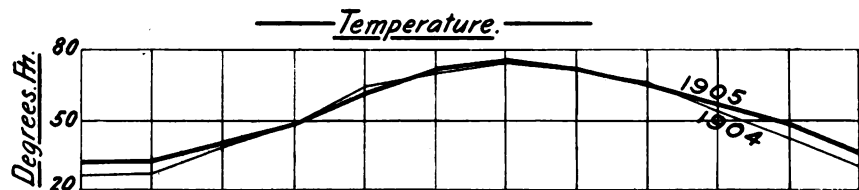
The pumpage at the High Service stations was 243,670 gallons per day in excess of that of 1904, and the increase in consumption of coal 454 tons.

The price of coal was 15 cents per ton greater than that of 1904, but the saving in labor and lubricants reduced the operating expenses to within \$552.12 of the total amount required for this service during 1904.

The following tables show the details of expenses, pumpage and other data, all of which are respectfully submitted.

Very respectfully yours,

ALLEN J. FULLER,
General Superintendent.



Quantity and Prices of Coal Consumed During 1905.

Pumping Stations.	Tons.	Price per ton.	Cost.
Spring Garden.....	66,722	\$2 98	\$195,485 46
Belmont.....	38,508	2 90	111,673 20
Queen Lane.....	45,613	3 18	145,049 34
Roxborough.....	45,209	2 98	132,462 37
Frankford, No. 1.....	7,126	2 95	21,021 70
Frankford, No. 2.....	11,711	2 95	34,547 45
Totals and averages.....	214,889	\$2 98	\$640,249 52
HIGH SERVICE STATIONS.			
Belmont.....	1,332	\$3 75	\$4,995 00
Roxborough.....	1,653	3 97	6,562 41
Roxborough Annex.....	2,595	3 97	10,302 15
Mt. Airy.....	316	3 30	1,042 80
Chestnut Hill.....	106	3 20	339 20
Frankford.....	662	3 40	2,250 80
Totals and averages.....	6,064	\$3 83	\$25,492 36
Grand total.....	221,553	\$3 00	\$665,741 88
Increase, 1905.....			
Decrease, 1905.....	3,764	3 26	\$67,954 94

Pea coal used at all the stations.

No. 1—Worthington Duplex. Capacity,
2,000,000 gallons per day.

BELMONT HIGH SERVICE
STATION, 1905.

No. 2—Worthington High Service.
Capacity, 5,000,000 gallons per day.

Total capacity, 7,000,000 gallons per day.

1905.	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.	OILS.		Mean Water Pressure per square inch less Mean Pressure on Suction Pipe.		Gallons Raised 100 feet per Pound of Coal.	
	Months.	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.		Lbs.	Cylinder.	Engine.	No. 1.		No. 2.
		Qts.	Qts.	No. 1.	No. 2.										
January.....	.....	741	.....	72,584,640	72,584,640	2,341,440	119	1,310	25	186	8	.....	73	387.49
February.....	.....	672	.....	65,560,320	65,560,320	2,341,440	110	380	25	163	7	.....	73	379.90
March.....	96	648	6,408,000	63,218,880	69,626,880	2,246,028	109	1,500	25	186	8	73	73	405.30	
April.....	184	536	12,282,000	52,292,520	64,574,520	2,152,484	107	370	25	180	8	73	73	384.68	
May.....	.....	732	.....	71,584,640	71,584,640	2,309,181	86	1,075	25	186	8	.....	73	519.94
June.....	8	712	534,000	69,462,720	69,996,720	2,333,224	85	400	25	180	7	73	73	524.61	
July.....	.....	741	.....	74,251,840	74,251,840	2,395,220	108	25	25	186	8	.....	73	438.86
August.....	.....	744	.....	68,876,471	68,876,471	2,221,821	122	1,785	25	186	8	.....	73	358.73
September.....	44	676	2,838,210	64,904,516	67,742,726	2,258,090	119	1,900	25	180	.....	73	73	360.84
October.....	.....	744	.....	71,699,620	71,699,620	2,312,890	113	1,435	25	186	.....	.....	73	402.78
November.....	.....	720	.....	67,082,755	67,082,755	2,236,091	127	1,940	25	180	.....	.....	73	334.92
December.....	.....	744	.....	67,808,350	67,808,350	2,187,366	121	370	25	186	.....	.....	73	357.27
Totals and averages.	332	8,416	22,062,210	809,327,272	831,389,482	2,277,779	1,331	1,290	25	2,190	62	73	73	464.61	

No. 1—Worthington Duplex.
Capacity, 5,000,000 gallons per day.

**ROXBOROUGH HIGH SERVICE
STATION, 1905.**

Total capacity, 10,000,000 gallons per day.

No. 2—Worthington High Duty
Duplex. Capacity, 5,000,000 gal-
lons per day.

1905.	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.	OILS.		Mean Water Pressure per Square Inch less Mean Pressure on Suction Pipe.		Gallons raised 100 feet per pound of Coal.
	Months.	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.		Lbs.	Cylinder.	Engine.	Qtrs.		Qtrs.	No. 1.	No. 2.
January.....	8	736	1,631,620	94,797,015	96,428,635	3,110,601	128	1,970	25	158	23	56	55	384.92
February.....	35	620	6,527,320	89,102,895	95,630, 15	3,415,364	135	350	25	140	21	56	56	371.15
March.....	12	600	2,025,540	99,184,455	101,209,995	3,264,838	110	940	25	180	23	56	56	482.36
April.....	206	424	41,661,300	54,857,820	96,519,210	3,217,307	124	2,100	25	180	22	56	56	405.23
May.....		766		97,467,430	97,467,430	3,144,110	118	750	25	186	23		56	432.05
June.....	6	714	1,336,500	93,918,245	95,254,745	3,175,158	114	1,360	25	180	22	56	56	435.98
July.....	9	735	1,853,280	94,885,005	96,738,285	3,120,589	115	1,300	25	186	23	56	56	435.03
August.....	9	735	2,073,060	89,385,330	91,458,390	2,950,270	108	910	25	186	23	56	56	442.55
September.....	695	25	92,902,670	2,941,005	95,843,675	3,194,789	155	1,870	25	180	22	56	56	325.48
October.....	740	2	100,649,362	25,400	100,908,352	3,255,108	176	1,900	25	186	23	56	56	299.24
November.....	544	175	71,370,200	21,665,310	93,035,600	3,101,186	201	2,080	25	180	23	56	56	241.68
December.....	14	729	2,619,540	83,808,455	86,427,995	2,787,999	161	1,250	25	186	23	56	56	280.62
Totals and averages.	2,368	6,270	324,650,572	822,271,955	1,146,922,527	3,142,253	1,652	1,280	25	2,128	271	56	56	380.27

No. 1—Davidson Rotary. Capacity,
1,000,000 gallons per day.
No. 2—Davidson Rotary. Capacity,
1,000,000 gallons per day.

MT. AIRY PUMPING STATION, 1905.

No. 3—Knowles Rotary. Capacity,
1,000,000 gallons per day.

Total capacity, 3,000,000 gallons per day.

1905.	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.	Oils.		Mean Water Pressure per Square Inch less Mean Pressure on Suction Pipe.			Gallons Raised 100 Feet per Pound of Coal.
												Cylinder.	Engine.				
	Months.	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	6	8	.....	270,000	360,000	.....	630,000	20,322	22	2,220	25	3	1	50	50	.....	10.99
February	38	47	.....	1,800,000	2,162,500	.....	3,962,500	141,517	26	760	25	6	2	50	50	.....	62.00
March	6	6	.....	260,000	270,000	.....	530,000	17,387	24	240	25	4	1	50	50	.....	8.96
April	9	12	.....	405,000	540,000	.....	945,000	31,500	24	740	25	6	1	50	50	.....	15.57
May	7	6	.....	315,000	270,000	.....	585,000	18,870	24	240	25	4	1	50	50	.....	9.55
June	19	18	.....	855,000	810,000	.....	1,665,000	55,500	30	800	25	8	3	50	50	.....	21.67
July	22	18	.....	990,000	810,000	.....	1,800,000	58,064	31	1,060	25	9	3	50	50	.....	22.93
August	24	20	.....	1,080,000	900,000	.....	1,980,000	63,870	31	1,560	25	9	3	50	50	.....	25.04
September	13	14	.....	585,000	630,000	.....	1,215,000	40,500	26	260	25	6	1	50	50	.....	18.65
October	11	11	.....	495,000	495,000	.....	990,000	31,935	25	500	25	4	2	50	50	.....	15.74
November	10	10	.....	450,000	450,000	.....	900,000	30,000	24	240	25	3	2	50	50	.....	14.97
December	6	15	.....	270,000	585,000	.....	855,000	27,580	25	1,000	25	4	2	50	50	.....	13.47
Totals and averages...	171	185	.....	7,784,000	8,282,500	.....	16,066,500	44,018	316	660	25	66	22	50	50	.....	19.96

No. 1--Knowles. Capacity, 250,000 gallons per day.

CHESTNUT HILL PUMPING STATION, 1905.

No. 2--Worthington Duplex. Capacity, 500,000 gallons per day.

Total capacity, 750,000 gallons per day.

1905.	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.	Oils.		Mean Water Pressure per Square Inch less Mean Pressure on Suction Pipe.		Gallons Raised 100 Feet per Pound of Coal.	
	Months.	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.		Lbs.	Qts.	Qts.	No. 1.		No. 2.
January.....							9	570	25						
February.....		16		674,040	674,040	24,072	9	252	25	3			50	37.24	
March.....							9	250	25						
April.....							8	1,685	25						
May.....							8	2,090	25						
June.....							8	1,295	25						
July.....							8	1,518	25						
August.....							8	1,500	25						
September.....							8	900	25						
October.....		3		125,460	125,460	4,047	9	80	25		1		50	6.00	
November.....		1		20,400	20,400	680	9	30	25		3		50	1.14	
December.....							8	425	25						
Totals and averages.		20		819,960	819,900	2,246	105	1,635	25	3	4		50	3.78	

No. 1—Holly Rotary Duplex.
Capacity, 3,000,000 gallons
per day.

FRANKFORD HIGH SERVICE STATION, 1905.

Total capacity, 7,000,000 gallons per day.

No. 2—D'Auria Horizontal
Compound. Capacity,
4,000,000 gallons per day.

1905.	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.	OILS.		Mean Water Pressure per Square Inch less Mean Pressure on Suction Pipe.		Gallons raised 100 feet per Pound of Coal.			
	Months.	No. 1.	No. 2.	No. 1.	No. 2.	Gallons.	Gallons.	Tons.		Lbs.	Cylinder.	Engine.	Qts.		Qts.	No. 1.	No. 2.
January.....	40	365	2,758,728	26,957,677	29,716,405	958,583	91	855	25	39	47	71	51	143.28			
February.....	31	114	1,333,920	8,216,474	10,150,394	362,514	51	690	25	26	23	71	66	115.97			
March.....	24	27	1,363,560	1,542,231	2,905,791	93,735	32	310	25	19	13	71	71	56.79			
April.....	43	5	2,484,948	255,312	2,740,260	91,342	23	770	25	16	15	71	71	73.73			
May.....	40	78	2,786,527	6,087,704	8,874,231	286,265	31	1,250	25	22	19	71	64	102.68			
June.....	51	512	2,788,221	45,481,317	48,269,538	1,608,984	101	840	25	30	55	71	44	174.10			
July.....	80	37	4,840,498	2,275,293	7,115,791	229,541	32	60	25	16	22	71	71	139.56			
August.....	392	41	20,088,856	2,465,061	22,553,917	727,545	46	830	25	36	47	71	71	305.52			
September.....	301	95	13,640,845	8,142,798	21,792,643	726,421	51	660	25	50	55	71	61	248.33			
October.....	240	342	10,401,683	20,101,825	39,503,508	1,274,306	88	1,690	25	65	70	71	55	225.26			
November.....	338	120	15,638,749	9,913,904	25,552,653	851,755	61	1,435	25	46	46	71	62	245.45			
December.....	358	24	15,626,460	1,646,920	17,273,380	557,205	51	490	25	37	45	71	71	211.83			
Totals and averages	1,938	1,760	94,361,985	142,086,516	236,448,511	647,804	662	920	25	402	457	71	63	175.21			

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APPENDIX C.

REPORT

OF THE

Assistant in Charge of Distribution

Philadelphia, January 15, 1906.

F. L. HAND, Esq.,
Chief, Bureau of Water.

DEAR SIR:—I have the honor to submit the following report on the distribution system for the year 1905:

Mains.

The following is a statement of the mains laid, re-laid, taken up, etc.:

New Work.

By Bureau of Water:

Service mains laid	132,494 feet.
Supply mains laid	7,263 feet.
Connections, etc.	10,050 feet.
Total	149,807 feet.

By Bureau of Filtration:

Pumping mains laid	9,500 feet.
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*Comparison of Conditions Relative to the Distribution,
1904-1905.*

	1904	1905	In- crease	De- crease
Service mains, 4-in. to 12-in.....	79,720	132,494	52,774	
Supply mains, 10-in. to 48-in.....	26,029	7,263		18,766
Pumping mains, 36-in. and 60-in..	97	9,500	9,403	
Connections and miscellaneous work	5,924	10,050	4,126	
Totals in feet	111,770	159,307	47,537	18,766
Re-laid 3-in. to 30-in.....	25,555	17,766		7,789
Miscellaneous repairs, 3-in. to 48-in.	3,164	3,403	239	
Taken up, 3-in. to 36-in.....	19,179	14,210		4,969
Lowered, raised, and shifted, 6-in. to 30-in.	5,009	5,168	159	
Totals in feet	52,907	40,547	398	12,360
Pipe cut off and abandoned, 3-in. to 12-in.	10,002	4,172		5,830

Meters.

	1904	1905	In- crease	De- crease
Meters in use	1,763	1,735		28

*Number of Dwellings and Principal Appliances for the
Use of City Water.*

	1904	1905	In- crease	De- crease
Dwellings with water	255,481	262,963	7,482	
Dwellings without water	11,778	11,700		78
Water closets	309,049	325,726	16,677	
Baths	296,453	304,205	7,752	
Wash paves	95,513	95,498		15
Basins and sinks	120,076	126,335	6,259	
Urinals	6,233	6,453	220	

Repairs.

Main ^s relaid	17,766 feet.	
Repairs general	3,403 feet.	
		<u>21,169 feet.</u>
Old pipe taken up	14,210 feet.	
Pipe lowered, raised and shifted	5,168 feet.	
		<u>19,378 feet.</u>
Total		<u>40,547 feet.</u>

Abandoned.

Three-inch	1,018 feet.	
Four-inch	1,558 feet.	
Six-inch	1,463 feet.	
Ten-inch	133 feet.	
Total		<u>4,172 feet.</u>

The total quantity of pipe handled for all purposes, throughout the year, was 199,854 feet, weighing 18,790,233 pounds.

The total quantity of new pipe laid was 159,307 feet, or 30.17 miles, making in addition to that previously laid, 1,496.83 miles now in use.

Fire Hydrants.

New style fire hydrants in new locations	345
New style fire hydrants in place of old style	324
Total	<u>669</u>
New style fire hydrants taken out	43
Old style fire hydrants taken out	8
Total	<u>51</u>

The total number of new style fire hydrants added to the distribution system was 294, and the total number in use December 31, 1905, was 14,311, of which 466 are of the old style and 13,845 or 96.74 per cent. are of the new pattern.

Drills for Attachments.

One-half inch.....	7,284	area of openings	1,430	square inches
Five-eighth inch	343	area of openings	105	square inches
Three-quarter inch..	165	area of openings	73	square inches
One inch	144	area of openings	113	square inches
One and one-quarter inches	28	area of openings	34	square inches
One and one-half in.	23	area of openings	41	square inches
Two inches	77	area of openings	242	square inches
Three inches	12	area of openings	85	square inches
Four inches	11	area of openings	138	square inches
Six inches	10	area of openings	283	square inches
Total	8,097	area of openings	2,544	square inches

For attachments, including ferrules, service pipes and curb stops, which were put in from the street mains to the curb, by employees of this Bureau, in order to provide for possible future service without breaking of street pavements, see Table "A."

Tabulation of work performed and of expenditures made are also submitted herewith, together with various other tables, compiled as in previous years.

The report of the pipe inspector, relative to the inspection of pipes and other castings during the year, in tabulated form, also accompanies this report.

Respectfully submitted,

W. WHITBY,

Assistant in Charge of Distribution.

SERVICE, SUPPLY AND PUMPING MAINS LAID DURING 1905.
FIRST DISTRICT.

Comprising the 1st, 2nd, 3rd, 4th, 26th, 30th, 36th, and 39th Wards.

Purposes for which used.	SIZE IN INCHES.							Total in feet and pounds.
	3	4	6	8	10	12	16	
New pipe or feet added.	Service mains.....			9,965	921	1,161	1,866	13,913
	Service main connections.....			11		69		80
	Fire hydrant connections.....			784				784
	Fire connections (private).....			47				47
	Drains.....				24			24
	Total..... { Feet..... { Pounds.....			10,807 356,631	945 39,690	1,230 67,650	1,866 139,950		14,848 603,921
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....			174		595		769
	Repairs, general.....	15	3	255	82	4	12	391
	Pipe taken up.....	28	129	82	100			339
	Total..... { Feet..... { Pounds.....	43 645	132 2,640	511 16,863	182 7,644	4 220	615 46,125	12 1,380	1,499 75,517
Total handled..... { Feet..... { Pounds.....	43 615	132 2,640	11,318 273,494	1,127 47,334	1,234 67,870	2,481 186,075	12 1,380	16,347 679,438
Pipe cut off and abandoned.....	620		24					644

SECOND DISTRICT.

Comprising the 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, and 17th Wards.

Purposes for which used.	SIZE IN INCHES.								Total in feet and pounds.	
	3	4	6	8	10	12	16	20		
New pipe of feet added.	Service mains.....			358	44		1,735	15		2,152
	Service main connections.....			42						42
	Supply main connections.....				8			22		30
	Bypass connections.....			81						81
	Fire hydrant connections.....			156						156
	Fire connections (private).....	16	8	289						313
	Supply connections (private).....	19	45	20						84
Total.....	35	53	946	52		1,735	37		2,858	
	525	1,060	31,218	2,184		130,125	4,255		169,367	
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....		292	230	156	2,844	971			4,493
	Repairs, general.....	3	4	187	44	44	40	10	4	336
	Pipe taken up.....	13	67	3,011	156	901				4,148
	Pipe lowered.....								73	73
	Pipe raised.....			187						187
	Pipe shifted.....						898			898
	Total.....	16	363	3,615	356	3,789	1,909	10	77	10,135
	240	7,260	119,295	14,952	208,395	143,175	1,150	11,935	506,402	
Total handled... }	51	416	4,561	408	3,789	3,644	47	77	12,993	
	765	8,320	150,513	17,136	20,395	273,300	5,405	11,935	675,769	
Pipe cut off and abandoned.....	398		32						430	

THIRD DISTRICT.

Comprising the 18th, 19th, 23rd, 25th, 41st, and part of 33rd and 42nd Wards.

Purposes for which used.	SIZE IN INCHES.											Total in feet and pounds.		
	3	4	6	8	10	12	16	18	20	30	48		60	
New pipe or feet added.	Service mains.....			35,662	91	7,467	599	5,902	1,337				43,819	
	Supply mains.....						24						7,263	
	Pumping mains.....											9,500	9,500	
	Service main connections.....			42									42	
	Supply main connections.....			10	42	64	37						153	
	Pumping main connections.....					82							82	
	Fire hydrant connections.....			1,207										1,207
	Fire connections (private).....	15	35											50
	Supply connections (private).....	43	35	2,104										2,182
	Motor connections (private).....		10											10
Drains.....			40										40	
Total.....	{ Feet.....	58	80	39,065	133	7,613	660	5,902	1,337			9,500	64,348	
	{ Pounds.....	870	1,600	1,289,145	5,586	418,715	49,500	678,730	207,235			10,830,000	13,481,381	
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....			7,742			58		276				8,068	
	Repairs general.....			100	3	61	126	4	5		48	1	574	
	Pipe taken up.....	17	4,317	2,647			23		250				7,254	
	Pipe lowered.....			580									580	
	Pipe raised.....			555			34						589	
Total.....	{ Feet.....	17	4,360	11,624	3	61	241	4	5	526	48	1	16,890	
	{ Pounds.....	255	87,200	383,592	126	3,355	18,075	460	650	81,530	15,840	650	591,733	
Total handled..	{ Feet.....	75	4,440	50,689	136	7,674	901	5,906	1,863	48	1	9,500	81,238	
	{ Pounds.....	1,125	88,800	1,672,737	5,712	422,070	67,575	679,190	650	288,765	15,840	650	10,830,000	14,073,114
Pipe cut off and abandoned.....			973	322									1,295	

FOURTH DISTRICT.

Comprising the 15th, 20th, 28th, 29th, 32nd and part of 37th and 38th Wards.

Purposes for which used.	SIZE IN INCHES.								Total in feet and Pounds.
	3	4	6	8	10	12	16	20	
New pipe or feet added.	Service mains		189	2,927			1,056		4,166
	Service main connections			81					81
	Supply main connections							24	24
	Bye-pass connections			208					208
	Fire hydrant connections			255					255
	Fire connections (private)			73					73
	Supply connections (private)	39	14		732				785
	Drains			6					6
Total	39	203	3,550	732		1,050	24	5,508	
	585	4,060	117,150	30,744		78,750	2,760	234,049	
Pipe used, but adding nothing to feet in ground.	Pipe relaid	24		1,127			50		1,201
	Repairs, general		104	216	19	20	12	16	387
	Pipe taken up		701	64					765
	Total	24	805	1,407	19	20	62	16	2,355
	360	16,100	46,431	798	1,100	4,650	2,480	71,919	
Total handled	63	1,008	4,957	751	20	1,112	24	7,951	
	945	20,160	163,581	31,542	1,100	83,400	2,760	305,968	
Pipe cut off and abandoned		9	464					473	

FIFTH DISTRICT.
Comprising the 21st and part of the 38th Ward.

	Purposes for which used.	SIZE IN INCHES.							Total in feet and pounds	
		4	6	8	10	12	20	30		48
New pipe or feet added.	Service mains.....		3,400	154						3,554
	Supply main connections.....		18							18
	Fire hydrant connections.....		180							180
	Fire connections (private).....		24							24
	Supply connections (private).....	27								27
	Drains.....		72							72
	Total..... { Feet.....	27	3,694	154						3,875
	{ Pounds.....	540	121,902	6,468						128,910
Pipe used, but adding nothing to feet in ground.	Pipe relaid.....		859							859
	Repairs, general.....	18	120		12	14	12	24	24	224
	Pipe taken up.....	30	55							85
	Pipe lowered.....		471							471
	Total..... { Feet.....	48	1,505		12	14	12	24	24	1,639
{ Pounds.....	960	49,665		660	1,050	1,860	7,920	15,600	77,715	
	Total handled..... { Feet.....	75	5,199	154	12	14	12	24	24	5,514
	{ Pounds.....	1,500	171,567	6,468	660	1,050	1,860	7,920	15,600	206,625
	Pipe cut off and abandoned.....		74							74

SIXTH DISTRICT.

Comprising the 22nd and part of the 33rd, 37th, 38th and 42nd Wards.

Purposes for which used.	SIZE IN INCHES.								Total feet and Pounds.
	3	4	6	8	10	12	16	30	
New pipe or feet added.	Service mains.....			12,236	1,401	472	40		14,149
	Supply main connections.....			37		59		58	154
	Bye-pass connections.....						34		34
	Fire hydrant connections.....			687					687
	Fire connections (private).....		31	34					65
	Supply connections (private).....	35							35
	Total..... { Feet..... { Pounds.....	35 525	31 620	12,994 428,802	1,401 58,842	531 29,205	74 5,550	58 6,670	15,124 530,214
Pipe used but adding nothing to feet in ground.	Pipe relaid.....		646	50		881			1,577
	Repairs general.....		93	483	19	9	134	43	805
	Pipe taken up.....		3	417		8	24		452
	Pipe lowered.....			1,131			434		1,680
	Pipe raised.....			138					138
	Pipe shifted.....			303					303
	Total..... { Feet..... { Pounds.....		96 1,920	3,118 102,894	69 2,898	17 935	1,473 110,475	43 4,945	139 45,870	4,955 269,337
Total handled..... { Feet..... { Pounds.....	35 525	127 2,540	16,112 531,696	1,470 61,740	548 30,140	1,547 116,025	101 11,615	139 45,870	20,079 800,151
Pipe cut off and abandoned.....		536	263						799

SEVENTH DISTRICT.
Comprising the 24th, 27th, 34th and 40th Wards.

Purposes for which Used.	SIZE IN INCHES.									Total in Feet and Pounds.	
	3	4	6	8	10	12	16	18	20		
New pipe or feet added.	Service main		497	37,090	8,786	3,971	397				50,741
	Pumping main connections.....							10	10		20
	Fire hydrant connections.....			1,554							1,554
	Fire connections (private).....			38							38
	Supply connections (private).....	21	38	48							107
	Motor connections (private).....	19									19
	Drains.....					103	24	22		28	177
Total..... { Feet	40	535	33,730	8,786	4,074	421	22	10	38	52,656	
{ Pounds.....	600	10,700	1,278,090	369,012	224,070	31,575	2,530	1,900	5,890	1,923,767	
Pipe used, but adding nothing to feet in ground.	Pipe relaid		7	311		456					774
	Repairs, general.....		9	480	52	327	18				856
	Pipe taken up.....		313	168	470	216					1,167
	Pipe lowered			167	82						249
	Total..... { Feet		329	1,126	604	999	18				3,076
{ Pounds.....		6,580	37,158	25,368	54,945	1,350				125,401	
Total handled... { Feet	40	864	39,856	9,390	5,073	439	22	10	38	55,732	
{ Pounds.....	600	17,280	1,315,248	394,380	279,015	32,925	2,530	1,900	5,890	2,049,168	
Pipe cut off and abandoned		40	284		133					457	

Alterations of Water Pipes on the line of the Market Street Subway.

PIPE RELAID.	PIPE.	
	Size.	Feet.
Market street, south side, from 12 feet east of east house line of Mole street to 137 feet west of west house line of Sixteenth st.	10	393
Market street, north side, from 84 feet east of east house line of Sixteenth street to 19 feet west of east house line of Twenty-first street.....	10	2,441
Market, north side, from 17 feet east of west house line of Twenty-first street, west.....	10	10
Market, from 84 feet east of east house line of Sixteenth street, west (City Hall Main).....	12	304
Market, from east house line of Twentieth street to 12 feet west of west house line of Twenty-first street, (City Hall Main) ..	12	607
Nineteenth, from 28 feet south of south house line of Market street, north.....	6	55
Sixteenth, from 6 feet south of south house line of Market st., north.....	6	86
Total.....		3,896
PIPE SHIFTED.		
Market, from 6 feet east of east house line of Eighteenth street to east house line of Twentieth street, (City Hall Main).....	12	898

		48	60	Total in Feet and Pounds.
New pipe or feet added.	Service			132,494
	Suppl.			7,263
	Pump		9,500	9,500
	Service			245
	Suppl.			379
	Pump			102
	Bye-p			323
	Fire h			4,823
	Fire c			610
	Suppl.			3,220
Motor			29	
Drain			319	
			9,500	159,307
		1,083,000		17,071,609
Pipe used but adding nothing to feet in ground.	Pipe			17,766
	Repa 06	25		3,403
	Pipe			14,210
	Pipe 15			3,053
	Pipe			914
	Pipe			1,201
		11	25		40,547
	30	16,250		1,718,624
	11	25	9,500	199,854
	30	16,250	10,830,000	18,790,233
Pipe cut o				4,172

Total Feet of Pipe in Use December 31, 1905.

Size in Inches.	Total in Use December 31, 1904.	EXTENSIONS AND RE-LAYS DURING 1905.			DEDUCTIONS DURING 1905.			Total in Use December 31, 1905.
		Laid.	Relaid.	Total.	Taken up.	Abandoned.	Total.	
1	175	.....	.....	.....	.....	.....	.....	175
1½	3,566	.....	.....	.....	.....	.....	.....	3,566
2	3,655	.....	.....	.....	.....	.....	.....	3,655
3	77,491	207	24	231	58	1,018	1,076	76,646
4	184,986	929	316	1,245	5,500	1,558	7,118	179,063
6	5,168,760	109,786	11,069	120,875	6,444	1,468	7,907	5,281,728
8	314,249	12,203	206	12,409	726	.....	726	325,932
10	462,087	13,448	3,300	16,748	1,125	133	1,258	477,577
12	479,941	5,806	2,555	8,361	47	.....	47	488,256
16	149,851	6,043	.....	6,043	.....	.....	.....	155,894
18	16,085	10	.....	10	.....	.....	.....	16,095
20	275,170	1,375	276	1,651	250	.....	250	276,571
22	606	.....	.....	.....	.....	.....	.....	606
23	27	.....	.....	.....	.....	.....	.....	27
24	13,149	.....	.....	.....	.....	.....	.....	13,149
30	296,215	.....	.....	.....	.....	.....	.....	296,215
36	101,491	.....	.....	.....	.....	.....	.....	101,491
48	197,111	.....	.....	.....	.....	.....	.....	197,111
60	.....	9,500	.....	9,500	.....	.....	.....	9,500
Total	7,744,565	159,807	17,766	177,073	14,210	4,172	18,382	7,903,256

Recapitulation of Fire Hydrants Set, Renewed and Removed.

Districts.		STYLE.				Total.
		O. S.	No. 1.	No. 2.	No. 3.	
Set.	First		47			47
	Second		12	2		14
	Third		87	9	1	97
	Fourth		11	9		20
	Fifth		12		1	13
	Sixth		39	2		41
	Seventh		95	6	12	113
Total			308	28	14	345
Renewed.	First					
	Second	1	51	16	5	73
	Third		33	4	4	41
	Fourth		35	30	6	71
	Fifth		32			32
	Sixth		47	2	1	50
	Seventh	1	49	5	4	59
Total		2	247	57	20	326
Total new fire hydrants		2	550	85	34	671
Removed.	First		8	1		9
	Second		9	1		10
	Third	1	4			5
	Fourth	2	1	1	1	5
	Fifth			1		1
	Sixth	1	5			6
	Seventh	4	7	3	1	15
Total		8	34	7	2	51
Total added during 1905						204

D TOTAL PREVIOUS THERETO.

CT.		FIFTH DISTRICT.			SIXTH DISTRICT.					SEVENTH DISTRICT.				Totals.	
Total.	Wards.		Total.	Wards.					Total.	Wards.					Total.
	21	38		22	33	37	38	42		24	27	34	40		
38	2,033		582						1,967					1,960	14,017
10	20	13	13	14	11		5	11	41	6	64	32	11	113	345
	2,053		595						2,008					2,073	14,362
	5	1	1	1	1		3	1	6	4	7	4		15	51
	2,048		594						2,002					2,058	14,311

..... 845
 3
 15
 8
 4
 1
 4
 2
..... 877

Fire Hydrants by Wards.

WARDS.	STYLE.						High Pressure	Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.		
First.....	3	202	67	8				280
Second.....	2	123	91	15				236
Third.....	3	78	42	6				129
Fourth.....	1	65	33	14				113
Fifth.....	17	102	61	6			17	203
Sixth.....	8	76	50	7			49	190
Seventh.....	6	144	84	7				241
Eighth.....	10	122	99	5		1	24	261
Ninth.....		120	84	3		1	32	240
Tenth.....		108	70			4	22	204
Eleventh.....	4	76	27					107
Twelfth.....	7	60	28	6				101
Thirteenth.....	23	62	70	9				164
Fourteenth.....		89	89					178
Fifteenth.....		233	213	5	1	2		459
Sixteenth.....	2	82	39	4	1			128
Seventeenth.....	11	81	34	1				127
Eighteenth.....	12	233	60	9				284
Nineteenth.....	31	333	123	4				491
Twentieth.....	19	136	132	3				290
Twenty-first.....	40	407	43	7				497
Twenty-second.....	62	1,141	150	22				1,375
Twenty-third.....	88	328	76	6				448
Twenty-fourth.....	38	309	152	13				512
Twenty-fifth.....		566	139	6				711
Twenty-sixth.....	1	233	123	14				371
Twenty-seventh.....	19	387	117	19		1		543
Twenty-eighth.....	1	164	138	25				328
Twenty-ninth.....	16	200	204	9		1		430
Thirtieth.....	5	126	110	6				247
Thirty-first.....		239	69	7				315
Thirty-second.....	8	129	95	10		1		243
Thirty-third.....	22	712	177	22	1			934

Fire Hydrants by Wards—Continued.

WARDS.	STYLE.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High Pressure	
Thirty-fourth	23	551	125	16	.....	1	.....	716
Thirty-fifth .....	.....	122	13	4	.....	.....	.....	139
Thirth-sixth	6	332	101	29	.....	.....	.....	468
Thirty-seventh	5	98	78	6	.....	.....	.....	187
Thirty-eighth.....	16	406	103	8	.....	.....	.....	533
Thirty-ninth.....	.....	227	90	7	.....	.....	.....	324
Fortleth	7	222	55	3	.....	.....	.....	287
Forty-first .....	.....	51	8	9	.....	.....	.....	68
Forty-second .....	.....	189	9	11	.....	.....	.....	209
Total	466	9,644	3,671	371	3	12	144	14,311

Fire Hydrants by Purveyor's Districts.

Districts.	STYLE.							Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	High Pressure.	
First.....	18	1,401	688	102	.....	.....	.....	2,209
Second.....	81	1,130	734	51	1	6	144	2,147
Third.....	106	2,441	638	67	1	.....	.....	3,238
Fourth.....	55	1,039	809	50	1	4	.....	2,048
Fifth.....	42	502	42	8	.....	.....	.....	594
Sixth.....	77	1,662	221	42	.....	.....	.....	2,002
Seventh.....	87	1,469	449	51	.....	2	.....	2,058
Total.....	466	9,644	3,671	371	8	12	144	14,311

Attachments, etc., made by the Purveyors in Accordance with Permits Issued by the Bureau of Water.

Districts.	NEW ATTACHMENTS.									SHUT OFF BY PERMIT.				WORK DONE WITHOUT PERMIT							
	SIZE.									Reamed for Larger Attachment.	Redriven.	Discontinued.	Transfer.	REPAIRS.		Discontinued and abandoned.	Delinquent.	Leak.	Transfer.	Total.	Drawn and Redrawn.
	1½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.					Not Drawn.	Drawn and Redriven.						
First.....	985	29	25	26	2	8	8	8	1,025	119	47	49	215	18	133	151	151	56	285	86	
Second.....	133	25	51	31	11	8	19	278	67	44	68	135	314	55	80	197	197	56	285	86	
Third.....	1,793	24	30	40	8	8	21	2,036	110	89	89	110	202	110	142	283	283	285	86	86	
Fourth.....	364	6	13	7	3	8	4	410	35	118	15	112	281	16	151	167	167	86	86	86	
Fifth.....	150	3	1	1	1	1	1	155	4	24	3	32	81	12	2	14	14	86	86	86	
Sixth.....	752	130	17	9	1	5	6	926	32	53	55	4	169	4	81	81	81	86	86	86	
Seventh.....	3,157	126	29	30	3	2	14	3,367	30	1	14	5	116	4	25	29	29	86	86	86	
Totals.....	7,284	343	165	144	28	23	77	8,057	168	350	201	17	556	215	614	862	862	490	490	490	

Permits Issued During the Year 1905.

Aquaria.....	3	Lawn sprinklers.....	5
Bakeries.....	33	Laundries.....	13
Barber shops.....	102	Laboratories.....	3
Bars.....	47	Machines for scouring, rinsing, etc.....	9
Basins and sinks in dwellings.....	5,414	Milk houses.....	42
Basins and sinks in offices, stores, etc.....	1,010	Motors (beer).....	43
Baths in dwellings.....	7,348	Motors (organ).....	16
Baths in hotels, etc.....	500	Photograph galleries.....	3
Baths (shower).....	16	Pantry sinks.....	481
Bidets.....	1	Pools (swimming).....	2
Boats, etc. (supply of).....	50	Pools (in churches).....	3
Bottling establishments.....	43	Restaurants and eating saloons.....	38
Building purposes.....	404	Slaughter houses.....	2
Carriages and wagons.....	68	Stables.....	20
Cellar drainers.....	5	Stalls (in stables).....	1,109
Dwellings.....	7,482	Stalls (cow).....	10
Dwellings (half).....	140	Steam boilers (number)....	150
Drug stores.....	25	Steam boilers (H. P.).....	6,020
Dye houses.....	10	Steam engines (number)....	63
Factories.....	20	Steam engines (H. P.).....	541
Ferrules (number).....	8,269	Street sprinklers.....	90
Filters.....	2	Tubs, vats and tanks.....	90
Fire hydrants (use of).....	106	Urinals in dwellings.....	5
Fish troughs and stands.....	8	Urinals in stores, offices, etc.	171
Forges.....	15	Urinal troughs.....	50
Fountains (counter).....	12	Wash paves and screw nozzles.....	2,107
Fountains (garden).....	11	Wash paves for watering horses.....	36
Green houses.....	11	Wash tubs (stationary)....	5,778
Heating boilers.....	39	Water closets in dwellings..	16,072
Hydrants in new dwellings..	6,682	Water closets in stores, etc.	747
Hydraulic elevators.....	1		
Ice cream saloons.....	7		

Premises Supplied and Appliances in Use
January 1, 1906.

Aquaria.....	29	Engines (railroads).....	875
Arsenals.....	2	Factories, foundries, mills..	2,150
Asylum.....	7	Filters.....	30
Bakeries.....	1,337	Fire stations.....	73
Barber shops.....	1,901	Fountains (garden).....	64
Bars.....	1,873	Fountains (counter).....	554
Basins and sinks in dwell- ings.....	92,891	Forges.....	1,231
Basins and sinks in offices and stores.....	33,444	Furnaces.....	22
Baths in dwellings.....	301,388	Gas works holders.....	7
Baths (Public).....	2,371	Glass works.....	16
Baths (Shower).....	356	Green houses.....	1,118
Baths (foot).....	90	Grindstones.....	120
Beam houses and tanneries	25	Halls and club houses.....	253
Bidets.....	437	Hatters' Planks (per set)...	20
Bottling establishments....	720	Hydrants.....	271,798
Brick yards.....	13	Hospitals.....	62
Brick yards (gangs of men).	70	Hotels.....	67
Breweries.....	90	Hydraulic elevators.....	274
Barrels (brewed).....	2,550,320	Ice cream saloons.....	155
Cars (steam and electric)...	1,800	Institutions.....	98
Carriages and wagons.....	9,415	Ice machines.....	145
Cellar drainers.....	63	Laundries.....	800
Cemeteries.....	23	Lawn sprinklers.....	281
Churches.....	695	Laboratories.....	41
Coal yards.....	250	Machines for washing and scouring.....	192
Coloring rooms.....	130	Marble yards.....	80
Condensers.....	28	Malt houses.....	20
Depot and railway sta- tions.....	100	Market houses.....	41
Dwellings (with water)....	262,963	Milk houses.....	465
Dwellings (without water).	2,000	Mints.....	1
Dwellings (half without water).....	9,700	Motors (beer).....	1,944
Dyers.....	760	Motors (organ).....	232
Drug stores.....	432	Photograph galleries.....	145
Dye houses.....	660	Photograph galleries (oper- ators).....	190
		Polishing wheels.....	17

Premises Supplied and Appliances in Use—Continued.

Police stations and patrols.....	70	Steam engines (H. P.).....	25,497
Pools (swimming).....	30	Steam saws.....	63
Pools (in churches).....	91	Steam presses and hammer.....	49
Printing (establishments).....	173	Shops and stores (with water).....	5,950
Prisons.....	4	Shops (without water).....	941
Rectifying (establishments).....	8	School houses.....	353
Restaurants and oyster saloons.....	1,223	Theaters.....	24
Shot towers.....	1	Tubs, vats and tanks.....	2,476
Slaughter houses.....	485	Turbine wheels.....	38
Soap boiling (establishments).....	17	Urinals in dwellings.....	285
Stand pipes for watering engines.....	58	Urinals in stores, offices, etc.....	5,376
Stables.....	8,378	Urinals (trough).....	792
Stalls (in stables).....	54,626	Vinegar (establishments).....	9
Stalls (cow).....	197	Wash paves and screw nozzles.....	94,762
Stalls (fish and trough).....	108	Wash paves for watering horses.....	736
Steam boilers (numbers).....	3,972	Wash tubs (stationary).....	50,454
Steam boilers (H. P.).....	141,833	Water closets in dwellings.....	295,679
Steam boilers (heating).....	1,036	Water closets in stores, etc.....	30,047
Steam boilers heating (H. P.).....	6,000	Wool washers.....	104
Steam engines (number).....	2,241		

*Repairs to Mains, Stops and Fire Hydrants, also Stops and
Fire Hydrants Renewed During 1905.*

DISTRICTS.	Repairs to Mains.	STOPS.			FIRE HYDRANTS.		
		Repaired.	Renewed.	Removed.	Repaired.	Renewed.	Removed.
First.....	41	920	4	6	430	.....	9
Second.....	63	89	4	10	762	73	10
Third.....	322	83	4	7	138	41	5
Fourth.....	224	437	1	1	446	71	5
Fifth.....	26	41	9	2	7	32	1
Sixth.....	60	25	2	11	8	50	6
Seventh.....	121	190	18	21	161	59	15
Totals.....	857	1,785	42	58	1,952	326	51

TABLE "A."

Service Attachments Laid to the Curb (on Streets to be Paved or Re-paved) by the Bureau of Water.

Districts.	NUMBER OF CONNECTIONS.	LENGTH IN FEET.
	Size ½-inch.	Size ¾-inch.
First	166	2,490
Second.....		
Third.....	1,275	16,401
Fourth.....	359	5,019
Fifth.....	22	315
Sixth.....	676	1,138
Seventh.....	684	13,236
Total.....	2,582	38,599

Account of Iron Stop Boxes, and New Stops.

Districts.	Iron stop boxes.	STOPS.						Totals.
		Dept.	Smith.	Eddy.	Eddy Rotary	Ludlow.	Rensselaer Rotary.		Viney.
First.....		84					1	85
Second.....	2	52	18					70
Third.....	49	219	8	17	2	3	1	230
Fourth.....	55	34	14					48
Fifth.....		19						19
Sixth.....	16	82	6	2		1		91
Seventh.....		226	1			1		228
Total.....	122	716	47	19	2	5	1	791

Total Number of Stops and Valves Arranged by Districts.

Pattern.	Size	Outlets.	DISTRICTS.							Total.
			1st.	2d.	3d.	4th.	5th.	6th.	7th.	
Single Gate. Bureau of Water.	3	2-way.	1	164	4	22	2	16	13	242
	4	2-way.	102	258	54	158	50	88	85	795
	6	2-way.	3,821	2,600	4,486	3,173	730	2,566	3,240	20,616
	8	2-way.	163	119	167	121	10	81	327	988
	10	2-way.	236	372	290	231	34	180	214	1,557
	12	2-way.	141	200	327	157	49	229	209	1,312
	16	2-way.	38	45	49	21	5	41	19	218
	18	2-way.	.....	.....	6	.....	.....	1	.....	7
	20	2-way.	24	85	20	37	14	16	29	175
	30	2-way.	8	9	29	27	15	3	3	104
	36	2-way.	3	2	8	12	11	.....	8	44
	48	2-way.	.....	.....	3	9	.....	.....	.....	12
Total. ...			4,587	3,824	5,443	3,978	920	3,221	4,147	26,070
Butterfly. Bureau of Water.	20	2-way.	.....	1	5	8	4	4	5	27
	30	2-way.	2	2	7	7	9	2	4	33
	36	2-way.	.....	.....	5	17	2	.....	.....	24
	48	2-way.	.....	2	7	30	22	.....	1	62
	Total....			2	5	24	62	37	6	10	146
Barton.	6	4-way.	3	3	.....	12	.....	.....	13	31
	8	4-way.	.....	.....	.....	5	.....	.....	.....	5
	6	5-way.	12	24	.....	.....	.....	.....	.....	36
	6	6-way.	.....	5	.....	.....	.....	.....	.....	5
	Total....			15	32	17	13	77

Total Number of Stops and Valves—Continued.

Pattern.	Size.	Outlets	DISTRICTS.							Total.
			1st.	2d.	3d.	4th.	5th.	6th.	7th.	
Viney.	6	2-way.	5	.....	6	3	.....	.....	.....	14
	6	3-way.	49	55	31	232	5	9	18	399
	8	3-way.	.....	.....	.....	.....	.....	.....	5	5
	10	3-way.	.....	.....	.....	3	.....	.....	.....	8
	12	3-way.	.....	1	.....	3	.....	.....	1	5
	6	4-way.	22	27	21	99	4	8	20	201
	8	4-way.	1	.....	2	.....	.....	.....	5	8
	10	4-way.	.....	.....	.....	14	.....	.....	1	15
	12	4-way.	.....	.....	.....	.....	.....	2	.....	2
	6	5-way.	24	5	1	26	.....	.....	3	59
	Total.....			101	88	61	380	9	19	53	711
Smith's Patent.	3	2-way.	1	42	2	4	.....	.....	6	55
	4	2-way.	4	38	3	8	.....	.....	4	57
	6	2-way.	4	68	27	38	9	11	20	177
	8	2-way.	1	1	18	.....	.....	.....	.....	15
	10	2-way.	.....	5	11	1	2	3	4	26
	12	2-way.	1	10	8	.....	.....	.....	1	20
	16	2-way.	4	1	2	.....	.....	.....	.....	7
	20	2-way.	.....	1	1	.....	.....	.....	5	7
	Total.....			15	168	67	51	11	14	40	364
Ludlow.	3	2-way.	.....	.....	12	1	.....	2	20	35
	4	2-way.	.....	.....	.....	1	.....	.....	1	2
	6	2-way.	.....	.....	.....	.....	5	.....	8	13
	Total.....			12	2	5	2	29	50
Eddy.	6	2-way.	.....	11	1	6	32	10	15	75
	8	2-way.	.....	.....	1	.....	1	5	.....	7
	10	2-way.	.....	8	.....	1	8	11	21	49
	12	2-way.	.....	5	1	.....	2	2	4	14
	16	2-way.	.....	2	.....	.....	2	15	15	34
	20	2-way.	.....	4	.....	1	2	11	9	27
	24	2-way.	.....	.....	.....	.....	4	.....	.....	4
	30	2-way.	.....	1	2	1	15	4	2	25
	36	2-way.	.....	.....	.....	.....	4	.....	8	12
	48	2-way.	.....	.....	17	.....	.....	.....	.....	17
Total.....			.....	31	22	9	70	58	74	264

Total Number of Stops and Valves—Continued.

Pattern.	Size.	Outlets.	DISTRICTS.							Total.
			1st.	2d.	3d.	4th.	5th.	6th.	7th.	
Eddy Rotary.	20	2-way.	.....	.....	2	.....	.....	.....	.....	2
	30	2-way.	.....	.....	.....	2	.....	1	.....	3
	Total.....		.....	.....	2	2	.....	1	.....	5
Rensaelar.	8	2-way.	.....	.....	4	16	.....	13	.....	33
	12	2-way.	.....	.....	.....	3	.....	.....	.....	3
	16	2-way.	.....	.....	2	4	.....	.....	.....	6
	20	2-way.	.....	.....	.....	2	.....	2	.....	4
	24	2-way.	.....	.....	.....	.....	.....	2	.....	2
	30	2-way.	.....	.....	.....	1	.....	.....	.....	1
Total.....		.....	.....	6	26	.....	17	.....	49	
Rensaelar Rotary.	30	2-way.	.....	.....	1	.....	.....	.....	.....	1

HIGH PRESSURE STOPS.

Williamsport.	8	2-way.	.....	190	.....	.....	.....	.....	.....	190
	12	2-way.	.....	54	.....	.....	.....	.....	.....	54
	16	2-way.	.....	19	.....	.....	.....	.....	.....	19
	Total.....		.....	263	.....	.....	.....	.....	.....	263
Ludlow.	20	2-way.	.....	4	.....	.....	.....	.....	.....	4
Total number of stops ...			4,670	4,413	5,638	4,527	1,052	3,333	4,366	28,004
Check Valves. Bureau of Water.	12	.....	.....	1	.....	.....	.....	.....	.....	1
	20	.....	.....	.....	.....	.....	.....	1	.....	1
	30	.....	.....	1	.....	5	.....	3	.....	9
	36	.....	.....	1	.....	4	.....	2	.....	7
	48	.....	.....	4	4	6	.....	.....	.....	14
Total.....		.....	1	6	4	15	.....	6	.....	32

*Number of Valves Raised in the Several Districts During
the Year 1905.*

Districts.	BARTON.	VINEY.			SINGLE GATE.						Total.	
	4-way.	3-way.	4-way.	5-way.	3-inch.	6-inch.	10-inch.	16-inch.	20-inch.	30-inch.		36-inch.
First.....		1	1		1	14		1				18
Second.....	5	4	1	1		13	1	1				26
Fourth.....		1				1			1	2	2	7
Total	5	6	2	1	1	28	1	2	1	2	2	51

Number of Complaints and Examinations during 1904 and 1905.

MONTHS.	HYDRANTS.		SERVICE PIPES.		WASH PAVES.		SPIGOTS.		WATER CLOSETS.		HORSE TROUGHS.		NO. LEAKS.		TOTAL.	
	1904.	1905.	1904.	1905.	1904.	1905.	1904.	1905.	1904.	1905.	1904.	1905.	1904.	1905.	1904.	1905.
January.....	253	119	340	105	14	4	10	12	55	28	3	.....	12	5	687	273
February.....	263	143	257	184	20	13	10	10	47	47	.....	.....	8	9	605	406
March.....	183	168	309	265	15	15	21	23	80	80	.....	.....	8	11	616	562
April.....	218	168	193	183	7	8	15	20	57	71	.....	.....	10	4	500	454
May.....	193	188	158	177	5	5	20	24	67	59	.....	.....	9	10	452	463
June.....	188	176	141	166	7	6	17	26	62	84	.....	.....	5	9	420	467
July.....	178	154	120	119	7	2	27	22	40	61	.....	.....	14	10	395	368
August.....	211	187	118	112	4	1	24	30	62	55	.....	.....	13	5	432	390
September.....	157	160	119	140	3	5	9	17	38	78	.....	.....	9	16	335	425
October.....	186	147	100	120	12	4	37	24	76	76	.....	.....	12	10	423	381
November.....	153	164	101	123	1	7	22	25	70	75	1	1	19	11	366	411
December.....	132	144	149	149	5	5	17	34	48	62	.....	1	8	13	350	408
Totals.....	2,315	1,918	2,114	1,857	100	75	229	267	702	776	4	2	127	113	5,590	5,008

New Meters Set.

Ward.	Occupant	Location.	Business.	Date When Set.	Name of Meter.	SIZE.							Cubic Feet Consumed.	Meter Rents.	Remarks.	
						1/2 inch.	3/8 inch.	3/4 inch.	1 inch.	1 1/2 inch.	2 inch.	3 inch.				4 inch.	6 inch.	Total.
2	P. C. Tomson & Co.	853 Water, 838 Swanson, & 19-29 Wash. avenue.	Soap works.....	Feb. 6.	Crown..	1							1	3,100	83 75	
19	T. Finkenaur.....	1715 north 5th street.....	Brewery.....	Mar. 29.	Crown..					1			1	826,000	337 95	
19	Thos. Henry & Sons	N. W. Oxford and Hancock sts.....	Holseery mill....	June 20.	Gem....					1			1	120,300	67 28	
22	J. & J. Dobson.....	Stenton ave. and Godfrey sts.....	Woolen mill....	Sept. 21.	Gem....								1	923,900	.....	Experimental.
22	J. & J. Dobson.....	Stenton ave. and Godfrey sts.....	Woolen mill....	Sept. 27.	Crown..	1							1	113,800	.....	Experimental.
24	Penna. R. R.....	N. S. Market st., E. of 32d.....	Depot.....	May 23.	Gem....								2	10,202,300	5,793 11	
24	Phila. Country Club	S. S. Cons' hocken, 250 E. of Wyndmere.	Golf links.....	July 18.	Gem....					1			1	26,000		
24	Phila. Country Club	N. E. Conshohocken & Monument avenue	Polo ground....	July 18.	Gem....					1			1	11,000		
25	P. & R. Rwy. Co.....	N. E. Lehigh & Trenton aves.....	Stand pipe.....	Aug. 11.	Gem....								1	1,685,400	2,267 36	
25	C. A. Loewel.....	W. S. Trenton ave., N. W. cor. Wishart	Cotton mill.....	Sept. 27.	Empire			1					1			
28	Phila. Traction Co.	Ridge ave., from Susq. to 32d.....	Depot.....	Dec. 14.	Gem....					1			1			
30	Giles & McLaughlin	1925-31 Washington ave.....	Stone yard.....	Aug. 8.	Crown..	1							1	11,100	.....	Experimental.
33	G. F. Pfund.....	3958-60 Nice st.....	Pork packer....	Aug. 17.	Crown..					1			1	1,092,300	401 36	
33	Thos. Potter Sons & Co.....	N. E. 2d & Venango sts.....	Oil Cloth works.	Oct. 22	{ Trident. Crest... }								1	798,000	.....	{ Fire attachment.

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date When Set.	Name of Meter.	SIZE.								Cubic Feet Consumed.	Meter Rents.	Remarks.		
						1/2-inch.	3/8-inch.	3/4-inch.	1-inch.	1 1/2-inch.	2-inch.	3-inch.	4-inch.				6-inch.	Total.
34	Providence Mills Mfg. Co.....	N. E. 55th & Girard ave.....	Finishing works	Feb. 14..	Gem						1			1	845,200	\$279 97		
38	Midvale Steel Wks.	Rear, N. W. of G. & C. H. R. R. on Cottage ave.....	Steel works.....	Mar. 16..	Gem								1	1	11,389,100	3,689 39		
39	Zophar Howell Estate.....	2100 south 8th street.....	Shirt factory....	Aug. 7..	Gem					1				1	22,700	37 10		
40	Fels Naptha Soap Mfg. Co.....	W. S. Island Rd., 277 S. Woodland ave.	Soap works.....	Sept. 12..	Gem							1		1	200	.....	} Fire attachment.
42	Phila. Rapid Transit Co.....	Wyoming ave. and Phila. & New-town R. R.....	Power house....	Aug. 2..	Gem					1				1	1,900	57		
Totals								3	1		6	3	1	6	20			

Schedule of Pipe and Special Castings, Ordered, Accepted and Rejected during 1905.

6	Manufacturer.	SIZE IN INCHES.		Ordered.	Inspected.	Rejected.	Broken and Lost in Transit.	Accepted.
		Pipe.	Special Castings.					
For Bureau of Water.	Donaldson Iron Company	6 in. ....	.....	5,600	6,512	912	.....	5,600
		8 in. ....	.....	1,000	1,125	125	.....	1,000
		10 in. ....	.....	1,100	1,241	141	.....	1,100
		Small .....	.....	1,428	1,747	319	1	1,428
		Large .....	.....	81	86	5	.....	81
		Breeches and quarter turns .....	.....	8	8	.....	.....	8
	R. D. Wood & Company	6 in. ....	.....	4,400	8,447	4,047	3	4,400
		12 in. ....	.....	600	1,288	688	.....	600
		24 in. ....	.....	25	92	67	.....	25
		Large .....	.....	18	16	3	.....	18
		Breeches pipe .....	.....	1	1	.....	.....	1
	J. Alfred Clark	Frames and covers .....	.....	500	558	58	.....	500
		Stop boxes .....	.....	500	528	28	.....	500
		Extra covers for frames .....	.....	105	116	11	.....	105
		Total		15,961	21,765	6,404	4	15,961

Schedule of Pipe and Special Castings, etc.—Continued.

Manufacturer.	SIZE IN INCHES.		Ordered.	Inspected.	Rejected.	Broken and Lost in Transit.	Accepted.
	Pipe.	Special Castings.					
C. J. Rainear & Company	3 in.			332	82		250
	4 in.			52	10		42
	6 in.			269	19		250
	8 in.			42			42
	12 in.			89	5		84
Total				784	116		608
Donaldson Iron Company				74	10		64
Total				74	10		64

For Bureau of Correction.

For E. P. Doyle.

*New Attachments Made and Delivered to the Districts
During 1905.*

DISTRICTS.	Number of Attachments Made and Delivered.	FEET OF LEAD PIPE.		Total.
		5/8-inch.	1-inch.	
First.....	60	1,146	.....	1,146
Second.....	1	.....	16	16
Third.....	979	12,851	.....	12,851
Fourth.....	100	1,600	.....	1,600
Fifth.....	.....	.....	.....	.....
Sixth.....	10	160	.....	160
Seventh.....	629	12,892	.....	12,892
Total.....	1,779	28,649	16	28,665

DISTRIBUTION EXPENSES DURING THE YEAR 1905.

Including Expenses of Main Office, Purveyors' Districts, and Meter Shops.

Material and Labor.	First District.	Second District.	Third District.	Fourth District.	Fifth District.	Sixth District.	Seventh District.	Distribution.	Meter Shops.	Main Office.	Totals.
Lead.....	\$1,151 17	\$1,080 78	\$3,994 77	\$686 48	\$826 57	\$941 04	\$3,212 91				\$11,843 72
Gasket.....	13 64	35 40	100 03	25 63	22 65		57 59		\$94 39		349 33
Coke.....	29 40	35 60	125 15	80 10	37 70	29 20	89 00				426 15
Wood.....						26 00	13 00				39 00
Pipes.....								\$73,363 50			73,363 50
Small specials.....								7,418 60			7,418 60
Large specials.....								3,365 83			3,365 83
Breeches and ¼ turns.....								571 30			571 30
Frames and covers.....	401 36	252 05	376 24	204 54	7 17	191 26	320 47				1,753 09
Cast, iron stop boxes.....	297 33	221 04	490 56	1,570 67		220 02	339 71				3,139 33
Hauling, transportation, and hotel								8,007 59			8,007 59
Supplies, tools, small stores, etc....	621 32	1,120 40	1,989 73	1,924 54	1,266 57	1,814 72	506 60	2,434 98	5,319 94		16,998 80
Plumbing and plumbing supplies..					13 62	68 60					82 22
Meters, etc.....									158 14		158 14
Brick, stone, lime, and cement....	14 38	33 38	322 81	415 13	44 18	239 16	28 50				1,097 54
Lumber.....	5,029 61	201 05	1,356 53	313 33	627 87	486 39	240 38		480 46		8,735 62
Hay, feed, etc.....	749 55	589 41	773 82	610 91	173 57	78 97	619 65				3,595 38

Distribution Expenses During the Year 1905—Continued.

Material and Labor.	First District.	Second District.	Third District.	Fourth District.	Fifth District.	Sixth District.	Seventh District.	Distribution.	Meter Shops.	Main Office.	Totals.
Stable supplies.....	\$696 41	\$79 24	\$1,185 72	\$4 06	\$312 76	\$68 22	\$11 23				\$2,352 64
Stable repairs.....	209 40	339 90	191 40	91 95	10 50	58 95	265 29				1,167 39
Stable medicines.....	36 75	36 68	84 45	4 00			72 40				284 28
Stable shoeing.....	253 00	239 00	329 05	63 50	28 50	50 00	133 50				1,096 55
Supplies, stationery.....	56 28	95 56	327 96	85 00	55 00	139 77	81 27	\$387 16	\$56 17	\$102 09	1,387 34
Wages.....											
{ Per diem.....	23,276 89	18,978 70	72,498 63	18,865 77	16,712 13	31,237 32	26,810 33				213,429 77
{ Salary.....	4,614 72	4,585 17	6,134 83	6,731 87	3,224 00	3,974 00	4,599 11				33,863 70
Total cost of labor and material, account of distribution.....	\$42,451 21	\$27,873 36	\$90,281 66	\$31,678 47	\$23,362 38	39,638 62	37,400 94	\$95,548 06	\$6,100 10	\$102 09	\$304,477 31
Buildings, grounds, and reservoirs.....		\$25 00	\$9,129 27	\$3,424 34	\$7,149 71	\$512 13	\$3,205 73				\$23,446 18
High pressure fire service.....		2,596 60									2,596 60
Testing station.....				18 50							18 50
Totals, labor and material....	\$42,451 21	\$30,496 96	\$99,410 95	\$35,121 31	\$30,512 69	\$40,180 75	\$40,606 67	\$95,548 06	\$6,100 10	102 09	\$420,540 50

APPENDIX D



REPORT

OF THE

Operations at the Construction and Repair Shop, Bureau of Water, during the year 1905



Philadelphia, January 12, 1906.

MR. F. L. HAND,
Chief, Bureau of Water.

SIR:—I herewith submit the annual report of the operations at the Construction and Repair Shop, Twelfth and Reed streets, for the year ending December 31, 1905.

Respectfully,

JAS. H. DEAN,
Superintendent of Shop.

MERCHANDISE.	DR.
Inventory, January 1, 1905.....	\$18,976 50
Bolts and nuts	\$656 17
Hardware	363 99
Steel	1,663 45
Wrought iron	1,109 95
Iron castings	14,757 83
Brass castings	4,782 30
Lead coating	419 85
Chandlery	248 01
Gum goods	253 78
Coal	1,510 10
Coke	25 20
Lumber	1,118 35
Paints, brushes and oils	123 77
Brass fittings	138 30
Oils and tallowes	123 97
Wrought iron pipe and fittings	9 09
Lead	1,145 99
Plug valves	420 00
Forage, stable supplies, etc.....	101 98
Miscellaneous	2,778 88
Wages	36,004 43
	<hr/>
	\$67,765 39
Total	\$86,741 89

MERCHANDISE.	CR.
First District	\$1,474 53
Second District	2,680 83
Third District	8,760 77
Fourth District	3,248 88
Fifth District	1,930 65
Sixth District	3,705 84
Seventh District	9,921 83
	<hr/>
	\$34,723 33
Spring Garden machinery	5,373 36
Spring Garden boilers	2,728 02
	<hr/>
	8,101 38
Fairmount machinery	952 31
	<hr/>
	952 31
Belmont machinery	7,799 26
Belmont boilers	1,212 19
	<hr/>
	9,011 45

Queen Lane machinery	4,360 69	
Queen Lane boilers	688 31	
		<u>5,049 00</u>
Roxborough machinery	2,820 52	
Roxborough boilers	1,202 01	
Roxborough buildings and grounds.	1,173 42	
		<u>5,195 95</u>
Frankford machinery	3,842 40	
Frankford boilers	1,030 61	
Frankford buildings and grounds...	207 41	
		<u>5,080 42</u>
General buildings and grounds.....	993 52	
		<u>993 52</u>
Distribution	432 01	
		<u>432 01</u>
Meter department	27 25	
		<u>27 25</u>
High pressure fire service.....	1,069 61	
		<u>1,069 61</u>
Extension, improvement and filtra- tion	212 48	
		<u>212 48</u>
City ice boats	24 63	
		<u>24 63</u>
Hydraulic work	13 40	
		<u>13 40</u>
Fixed patterns	1,041 06	
		<u>1,041 06</u>
Shop machinery	2,308 33	
		<u>2,308 33</u>
Construction and repair shop	1,696 48	
		<u>1,696 48</u>
		<u>\$75,932 61</u>
Credit		\$75,932 61
Inventory, January 1, 1906.....		20,066 70
		<u>\$95,999 31</u>
Total Cr.		\$95,999 31
Total Dr.		86,741 89
		<u>\$9,257 42</u>
Balance		\$9,257 42

INVENTORY, JANUARY 1, 1906.

6 4-inch stop valves, at \$15.....	\$90 00	
22 6-inch stop valves, at \$17.50.....	385 00	
1 8-inch stop valve, at \$26.....	26 00	
4 10-inch stop valves, at \$36.....	144 00	
4 16-inch stop valves, at \$78.....	312 00	
2 20-inch stop valves, at \$120.....	240 00	
2 30-inch stop valves, at \$230.....	460 00	
2 6-inch stop valves, hat flanged, at \$18	36 00	
1 10-inch stop valve, hat flanged, at \$33	33 00	
1 6-inch globe valve, at \$30.....	30 00	
2 large drilling machines, at \$65....	130 00	
2 small drilling machines, at \$45....	90 00	
5 bell cranks, at \$17.....	85 00	
	<hr/>	\$2,061 00
1 48-inch rotary valve, unfinished, at \$536	536 00	
2 48-inch check valves, unfinished, at \$493	986 00	
3 20-inch rotary quadrants, at \$10..	30 00	
8 30-inch rotary quadrants, at \$10..	80 00	
3 48-inch rotary quadrants, at \$16..	48 00	
3 30-inch eddy quadrants, at \$10....	30 00	
	<hr/>	1,710 00
Finished parts of fire hydrants...	654 65	
Finished parts of stop valves.....	1,337 98	
Finished parts of rotary valves...	169 50	
	<hr/>	2,162 13
29 Viney stop screws, at \$1.75.....	50 75	
11 Viney stop screws, at \$2.....	22 00	
41 Viney stop screws, at \$4.50.....	184 50	
8 independent Viney stop screws, at \$4.50	36 00	
23 Barton stop screws, at \$4.....	92 00	
12 Barton stop screws, at \$8.....	96 00	
	<hr/>	481 25
321 new style stop screws, 4 inches to 48 inches	1,241 45	
80 socket screws	160 00	
15 spindles	33 75	
	<hr/>	1,435 20
Iron bands, 4 inches to 48 inches..	1,155 75	
	<hr/>	1,155 75
45 4-inch fire hydrant valves, at 59c.	26 55	
15 6-inch fire hydrant valves, at \$1.59	23 85	
	<hr/>	50 40

Screws, nuts, etc., for high pressure fire service	102 25	
		102 25
29 air pump rod straps, at \$9.....	261 00	
53 air pump rod brasses, at \$2.50.....	132 00	
64 sets gibs and keys, at \$4.50.....	288 00	
7 spindles for drilling machine, at \$6.50	45 50	
135 fire hoe heads, at \$1.75.....	236 25	
		962 75
Articles and tools carried in stock, issued to districts	1,660 03	
		1,660 03
32,464 lbs. wrought iron, at 2¼ cts.....	730 44	
1,063 lbs. Norway iron, at 3 cts.....	31 89	
8,067 lbs. American cast steel, at 5 9-10 cts.	475 96	
300 lbs. English cast steel, at 13 cts..	39 00	
687 lbs. spring steel, at 4 cts.....	27 48	
300 lbs. self-hardening steel, at 35 cts	105 00	
15,001 lbs. machinery steel, at 2½ cts..	375 02	
1,125 lbs. expansion metal, at 24½ cts.	275 62	
18,290 lbs. lead, at 4.485 cts.....	820 31	
		2,880 72
17,353 lbs. fire hydrant castings, at 2 2-10 cts.	381 77	
26,128 lbs. stop castings, at 2 2-10 cts..	574 82	
11,420 lbs. machine and miscellaneous castings, at 3 cts.....	342 60	
513 lbs. yellow brass castings, at 12.45 cts.....	63 87	
3,002 lbs. red brass castings, at 14¾ cts	431 54	
5,901 lbs. Ajax metal, at 22¾ cts.....	1,320 35	
1,391 lbs. round rolled brass, at 14 2-10 cts.	197 52	
		3,312 47
Hardware	122 61	
Bolts and nuts	676 40	
Oils and tallows	74 22	
Chandlery	29 93	
Paints, oils, brushes, etc.	10 16	
Gum goods	41 25	
Lumber	1,138 18	
		2,092 75
Total		\$20,066 70

Principal Articles Delivered to the Districts and Works.

Districts.	No. 1 Fire Hydrants.		No. 2 Fire Hydrants.		WEDGE STOP VALVES.							PLUGS.		GLOBE VALVES.			Iron Bands.	Stop Screws.
	4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	30-inch.	Wood.	Brass.	6-inch.	8-inch.	10-inch.	4	1	40	83		
First.....	1	59	2	5	10			57	243								4	
Second.....	2	28		11	7			94	351								18	
Third.....	2	172	5	20	3	2		126	697								12	49
Fourth.....		12			2			12	318								2	
Fifth.....	5	32							126								21	
Sixth.....	1	68	1	1	1												31	
Seventh.....	8	184	19	15	1	1		225	246								10	
Works.....																		
Totals.....	19	555	27	52	24	2	1	514	1,801	4	1						40	83

PRINCIPAL ARTICLES MANUFACTURED DURING 1905.

25 4-inch stop valves, at \$15.....	\$375 00
577 6-inch stop valves, at \$17.50.....	1,097 00
28 8-inch stop valves, at \$26.....	728 00
56 10-inch stop valves, at \$36.....	2,016 00
24 12-inch stop valves, at \$45.....	1,080 00
6 16-inch stop valves, at \$78.....	468 00
2 20-inch stop valves, at \$120.....	240 00
2 30-inch stop valves, at \$230.....	460 00
1 36-inch stop valve, at \$760.....	760 00
350 No. 1 fire hydrants, at \$33.50.....	11,725 00
2,624 brass plugs, various sizes	700 00
1,410 wood plugs, various sizes	705 00
	<hr/>
	\$20,354 00

APPENDIX E.

 REPORT

OF THE

CHIEF DRAUGHTSMAN

FOR THE YEAR 1905

Philadelphia, January 11, 1906.

F. L. HAND, ESQ.,
Chief, Bureau of Water.

DEAR SIR:—The following report of work under my charge, in the draughting room, for the year 1905, is respectfully submitted.

A large number of reports, diagrams, sketches, tables of statistics, etc., were made which were not recorded with the regular standard drawings, but which consumed much time, and involved considerable labor. The results were used for a different class of work and a portion of them kept on temporary file for reference if required.

There are now about three thousand six hundred recorded drawings in sheets, relating to the plants and property of the Bureau, to which reference is daily made.

Drawings relating to the following-named subjects were made and recorded during the year:

Plans and details of buildings	16
Details of engines	27
Boilers	2
Intakes and conduits	2

Reservoirs	8
Valves	2
Surveys	5
Maps	2
Diagrams, Tables, &c.	12
Pumpage Diagram (Water Color)	1
Pipe Plans	4
Repairs to Fairmount Dam	6

About 1,000 blue prints of various drawings required for repairs and renewals of engines, etc., were made with the electric light printing frame.

One draughtsman was detailed to superintend the repairs to Fairmount Dam, under contract with David Peoples, when the work began upon the part left unfinished when work was stopped in the fall of 1904.

The work was completed about July 10, in so far as the material on hand could be used.

Drawings for a new boiler house and stack, ten (10) new boilers and an enlargement of the engine house to accommodate four (4) more engines, also for a new forebay and intake for the Belmont Pumping Station were revised and alterations made in the specifications therefor.

From data prepared by the inspectors of the Bureau one hundred and thirty-eight (138) calculations for boiler and engine horse power were made.

From these computations were determined the water rents to be paid by the owners of steam boilers using water from the City mains.

Two draughtsmen were assigned to the task of taking indicator cards when called upon to do so.

The daily pumpage and storage chart, showing the height of water in Fairmount Pool, C. D., the water flowing over the flash boards, the rainfall and the temperature of the air and water, and the daily stream flow charts of the Perkiomen, Neshaminy and Tohickon Creeks, for the year 1905, have been prepared as in previous years.

REPORT
ON THE
HYDROGRAPHIC WORK
FOR THE YEAR 1905

The following report on hydrographic work in charge of the Chief Draughtsman, and on data collected during the year 1905, is respectfully submitted:

Rainfall observations at twenty-two stations, from which the Bureau obtained this data, have been carried on, completing twenty-three years of continuous records.

Nine of these stations are maintained by the Bureau and furnished with instruments, stationery and postage. The observers are paid a small monthly salary for the services rendered.

Three of the stations are furnished with self-registering rain gauges, and at five stations automatic stream gauges are in operation, recording continuously the height of water in the streams. From the curves traced by the instruments the monthly and yearly flow is computed.

Stream flow observations with the automatic gauges have been continued on the Perkiomen, Neshaminy, Tohickon, Schuylkill and Wissahickon streams, making twenty-two years of continuous records relating to stream flow on the three first-named streams and seven years on the Schuylkill river. Observations on the Wissahickon have been interrupted at various times and a continuous yearly record interfered with.

Observations have been continued on the height of water in Fairmount Dam with the automatic gauge put in operation in the wheel house at the east end of the dam. This

gauge is set at City Datum for zero, and to correct the assertion that the gauge was incorrectly set, a series of levels were run from a bench at the western end of the dam from a cut stone sill, front entrance to the collector's office of the Schuylkill Navigation Co., elevation given by Edwin F. Smith, Engineer, Schuylkill Navigation Co., 12.74 C. D.; also from a bench N. E. Cor. Twenty-fifth and Buttonwood streets, elevation given by the Philadelphia City District Surveyor, 26.139 C. D. These two different bench marks were brought to the zero mark of the gauge and found to very nearly agree, the difference being 0.028, showing that the gauge record is practically correct height of water in the Fairmount Pool, C. D.

Daily computations of the amount of water flowing over the flash boards were made from the records of the automatic gauge, the known pumpage from the river, the quantity used for power through the wheels, the leakage and lockage (both estimated), which give an approximation of the monthly flow of the Schuylkill river at Fairmount dam.

A comparison of the inches of rainfall flowing off in the Schuylkill river, with the run off, in inches, on the Perkiomen and Neshaminy creeks is shown in the following table:

Inches of rainfall flowing off		Perkiomen.	Neshaminy.	Schuylkill.
Jan.	to Dec.			
1898	21.50	22.22	24.39
1899	24.66	21.03	22.29
1900	15.21	17.27	18.23
1901	17.55	22.80	17.80
1902	29.01	30.74	29.02
1903	27.23	26.32	27.79
1904	23.07	23.37	18.84
1905	23.62	17.98	18.95

At present there is no method available by which the low water flow for periods of less than one month can be determined.

The daily average flow of the Schuylkill river, as given

in Table VIII, is computed from the total monthly flow, and is often, for several days at a time, much less than shown in the table. -

The greatest monthly rainfall on the watershed of the Schuylkill river during the year 1905 was 8.42 inches, being the average of 18 stations for the month of August. The rainfall was very evenly distributed over the valley throughout the month, but under these conditions and a very low river, only a moderate rise was produced in the river and an average flow for the month. During the preceding three months no water passed over the flash boards, the flow of the river reaching a minimum.

The rainfall for the year was from four to five inches less than the average for the past 23 years, and a correspondingly diminished flow was observed in all the rivers and streams in the eastern part of the State.

I quote as follows from the report of Mr. John C. Beans, Moorestown, N. J. :

“Of the precipitation of January, February and March, 2.20 in., and of April, .06 in., and of December, .26 in. fell in snow. By surface thawing, soaking and freezing alternately, earlier, the earth was so impervious to water from January 1 to March 17 that the 5.66 in. of January and February and 2.01 in. of that of March must have largely escaped as surface drainage. The same thing occurred, to a like rare degree, during the previous winter also, and well springs were more markedly lessened than farmed crops during the summer and fall, for along with the scant rainfall the year was fairly free from hot suns, dry airs and dry winds. There were several artesian wells dug, but no special, serious drought occurred.

“The rainfall of 1905 was 38.88 in. ; of preceding 41 years 45.81 in. is the mean.”

The stream flow for the Perkiomen, Neshaminy and Tohickon creeks was very much below the average, especially on the Tohickon, which shows a loss of 29 million gallons per day. This stream reached a very low stage during the month of July.

Observations on the Wissahickon have been carried on continuously since January 1; this stream does not show a correspondingly low flow when compared with the other streams.

The following-named tables, compiled as in previous years, accompany this report:

I. Monthly precipitation on sundry water sheds.		
II. } Rain storms exceeding $\frac{1}{4}$ inch per	}	Philadelphia. Forks of Neshaminy. Spring Mount.
III. } hour		
IV. }		
V. } Inches of rainfall flowing in the	}	Perkiomen. Neshaminy. Tohickon. Wissahickon. Schuylkill.
VI. } Average annual yield of streams		
VII. } Comparative stream flow.....		
VIII. } Monthly and daily yield of.....	}	Perkiomen. Neshaminy. Tohickon. Wissahickon. Schuylkill.
IX. }		

The Bureau is indebted to the following-named persons who have kindly furnished rainfall records:

Mr. J. L. Heacock, Quakertown, Pa.

Mr. John C. Beans, Moorestown, N. J.

Mr. Benjamin H. Shoemaker, Pennsylvania Hospital.

During the years 1904 and 1905 all observations on rainfall were taken uniformly in accordance with the instructions given at the beginning of the year.

Yours respectfully,

JOHN E. CODMAN,

Chief Draughtsman.

tions at Philadelphia.

ELEVATION.	TOHICKON SERIES.				NESHAMINY SERIES.		
	WEST CHESTER.	Otisville.	Quakertown.	Smith's Corner.	Point Pleasant.	Lansdale.	Forks of Neshaminy.	Doylestown.
55	390	536	480	119	350	143	405
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Janua 00	4.76	4.84	4.86	3.94	4.67	4.70	4.21
Febru 78	2.26	1.19	1.87	2.32	2.01	2.40	2.43
March 23	3.80	3.27	3.65	3.75	3.08	3.79	4.62
April 86	3.00	2.31	3.07	3.23	3.80	3.64	4.15
May 35	0.91	0.85	0.77	0.56	0.96	2.15	1.10
June 65	2.19	2.80	2.64	2.64	2.10	2.59	2.81
July 80	4.39	3.96	3.85	3.55	2.81	2.67	2.88
August 30	7.42	10.71	10.01	0.81	9.15	7.57	9.45
Septem 50	4.55	5.52	4.60	3.96	3.21	2.98	4.65
October 00	3.83	4.05	3.83	3.56	3.62	3.70	3.79
Novem 18	2.97	3.14	2.91	2.67	2.40	2.20	3.02
Decem 37	2.20	2.91	3.33	3.13	2.93	3.33	3.46
T 92	42.48	45.34	45.30	43.12	41.53	41.72	46.57
P 17	104	112	111	105	101	102	114
23 Year 56	47.75	49.05	51.54	49.63	45.11	46.16	46.33
28	118	122	128	123	122	115	116
Average 64	-5.27	-3.41	-6.15	-6.51	-3.58	-4.44	+0.24
Percent 6	11	7	12	12	8	13	0.5

TABLE II.

Rain Storms Exceeding in Rate 0.25 Inches per Hour, as Recorded by the Automatic Rain Gauge at Philadelphia, for the Year 1905.

DATE OF OBSERVATION.	AUTOMATIC RAIN GAUGE.					REMARKS.
	TOTAL FALL		MAXIMUM FALL			
	Amount in Inches.	Duration Hours, Minutes.	Amount in Inches	Duration in Minutes.	Rate per Hour During Maximum Fall.	
January 7, rain storm	1.34	11—00	.30	60	.30	
April 5, shower	0.93	1—05	.30	60	.30	
April 10, shower.....	0.81	8—00	.10	08	.75	
May 16, shower.....	0.45	1—00	.30	20	.90	
July 22 and 23, rain storm...	1.18	16—40	.35	40	.52	
August 6, shower.....	1.80	2—30	1.75	90	1.20	
August 12, shower.....	0.50	3—00	.30	60	.30	
August 13, shower.....	0.76	3—15	.60	20	1.80	
August 24 and 25, rain storm	2.05	11—00	1.75	35	3.00	
September 2 & 3, rain storm	2.09	21—15	.10	10	.60	
September 4, rain storm.....	.....	.....	.65	30	1.65	
October 3, shower	0.66	2—00	.45	25	1.08	
October 11, rain storm.....	1.34	12—40	.45	35	.90	
October 19 & 20, rain storm..	1.31	17—00	.20	15	.80	
December	2.15	13—00	.15	20	.45	

TABLE III.

Rain Storms Exceeding in Rate 0.25 Inches per Hour, as Recorded by the Automatic Rain Gauge at Forks of Neshaminy, for the year 1905.

DATE OF OBSERVATION.	AUTOMATIC RAIN GAUGE.					REMARKS.
	TOTAL FALL.		MAXIMUM FALL.			
	Amount in Inches.	Duration—Hours, Minutes.	Amount in Inches.	Duration in Minutes.	Rate per Hour During Maximum Fall.	
January 7th, rain storm.....	1.83	9—15	.80	60	0.30	
April 6th, shower.....	0.84	1—10	.15	15	0.60	
April 21st, shower.....	0.31	4—00	.10	10	0.60	
April 27th, shower.....	0.60	1—10	.20	20	0.90	
May 16th, shower.....	0.86	1—05	.80	20	2.49	
May 28th, shower.....	0.89	0—45	.89	20	0.90	
June 7th, shower.....	0.84	1—40	.18	16	0.48	
June 12th, shower.....	0.58	5—50	.15	25	0.86	
June 22d, shower.....	0.81	4—20	.60	40	0.90	
July 3d, shower.....	0.10	15	.10	15	0.40	
July 13th, shower.....	0.36	40	.33	40	0.54	
July 23d, rain storm.....	0.58	15—30	.10	20	0.30	
August 5th, shower.....	0.29	29	.29	29	0.60	
August 6th, shower.....	0.63	1—00	.43	15	1.72	
August 10th, shower.....	0.35	1—00	.25	20	0.75	
August 12th, shower.....	0.38	2—00	.28	15	1.52	
August 13th, shower.....	1.84	4—40	.50	20	1.50	
August 15th, shower.....	1.55	16—10	.89	30	1.60	
August 24th and 25th, rain storm.....	1.08	22—20	.25	60	0.25	
August 30th, shower.....	0.46	2—10	.20	15	0.80	
September 2d and 3d, rain storm.....	1.17	24—00	.15	10	0.90	
October 3d, shower.....	0.36	1—45	.15	10	0.90	
October 11th, rain storm.....	0.99	6—00	.15	10	0.90	
October 21st, rain storm.....	1.75	20—10	.45	20	1.85	
December 21st, rain storm...	1.52	12—45	.20	20	0.60	
December 30th, rain storm...	0.61	3—00	.15	15	0.60	

TABLE IV.

Rain Storms Exceeding in Rate 0.25 Inches per Hour, as Recorded by the Automatic Rain Gauge at Spring Mount, for the Year 1905.

DATE OF OBSERVATION.	AUTOMATIC RAIN GAUGE.					REMARKS.
	TOTAL FALL		MAXIMUM FALL.			
	Amount in Inches.	Duration Hours. Minutes.	Amount in Inches.	Duration in Minutes.	Rate per Hour During Maximum Fall.	
January 7, rain storm.....	1.78	11—50	.10	20	.30	
March 25, rain storm.....	0.34	12—40	.15	20	.45	
April 21, shower.....	0.28	2—00	.20	20	.60	
May 18, shower.....	0.42	1—20	.20	10	1.20	
May 30, shower.....	0.30	2—00	.10	15	.40	
June 6, rain storm.....	1.02	18—00	.20	15	.80	
June 7, rain storm.....			.30	15	1.20	
June 12, shower.....	0.95	6—30	.30	30	.60	
June 19, shower.....	0.16	11	.15	10	.90	
June 22, shower.....	1.21	5—10	.75	35	1.30	
July 3, shower.....	0.15	10	.15	10	.40	
July 23, shower.....	1.95	4—50	.50	35	.86	
August 6, shower.....	1.25	1—10	1.20	40	1.80	
August 8, shower.....	0.64	1—00	.60	30	1.20	
August 12, shower.....	0.71	2—20	.55	30	1.10	
August 15, rain storm.....	2.29	6—10	.80	40	1.20	
August 16, rain storm.....	0.41	7—00	.40	35	.70	
August 25 and 26, rain storm	2.49	20—00	.45	20	1.35	
September 2 & 3, rain storm	0.91	17—20	.10	15	.40	
September 4, rain storm....	0.43	4—30	.30	30	.60	
October 3, shower.....	0.55	1—10	.35	20	1.05	
October 11, rain storm.....	0.97	6—10	.45	30	.90	
October 19 & 20, rain storm..	2.31	19—45	1.00	40	1.50	
November 20, rain storm....	2.53	27—20	.20	30	.60	
December 21, rain storm....	1.05	13—00	.10	10	.60	

TABLE V.—Inches of Rainfall Flowing in the Perkiomen, Neshaminy, and Tohickon Creeks.

Watersheds.	Area in Miles.	PERCENTAGE OF TOTAL AREA.				AVERAGE FOR 22 YEARS, 1888-1905.													
		Woodland.	Cultivated.	Flats.	Roads.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.	
Perkiomen at Frederick, 22 years	152	25	71	2	2	2.94	3.53	3.81	2.16	1.82	0.92	1.14	1.06	1.08	1.07	1.51	2.25	23.04	
Neshaminy, below Forks, 22 years	139.3	6	92	¼	1¾	3.22	3.95	3.82	2.14	1.51	0.75	0.99	1.02	0.85	1.03	1.34	2.36	22.85	
Tohickon, 22 years	102.2	24	72	2	2	3.78	4.34	4.84	2.47	1.77	0.82	1.16	1.27	1.26	1.10	1.79	2.88	27.47	
Perkiomen at Frederick.	Maximum, 22 years					5.40	9.73	6.68	3.43	6.63	2.65	4.69	2.48	3.68	2.82	6.67	6.45		
	Minimum, 22 years					0.50	1.25	2.88	0.97	0.46	0.28	0.17	0.28	0.16	0.20	0.24	0.6		
Neshaminy, below Forks.	Maximum, 22 years					6.77	10.41	7.11	4.20	7.41	2.46	5.47	3.37	3.81	4.55	6.31	5.55		
	Minimum, 22 years					1.60	0.90	1.84	1.03	0.35	0.08	0.04	0.14	0.03	0.06	0.11	0.41		
Tohickon	Maximum, 22 years					7.34	10.41	8.00	4.76	8.56	3.43	6.41	3.75	5.49	4.27	7.07	7.58		
	Minimum, 22 years					0.54	0.62	2.98	0.73	0.10	0.07	0.11	0.04	0.05	0.05	0.14	0.67		

TABLE VI.—Average Annual Yields of Sundry Watersheds to October 1, 1905.

Watersheds.	Period covered in years.	Area in mi es.	Average rainfall in inches.	Average rainfall flowing off in inches.	Per cent flowing off.	Average daily yield in gallons.	Average yield in cubic feet per second per square mile of drainage area.	Average yield in cubic feet per square mile of drainage area for each inch of rainfall.
Perkiomen at Frederick	22	152.0	47.633	23.044	48.411	167,658,000	1.6975	0.0855
Neshaminy below Forks.....	22	139.3	47.822	22.851	47.900	151,580,000	1.6834	0.0841
Tohickon	22	102.2	48.813	27.474	56.350	139,850,000	2.040	0.5412
Wissahickon.....	9 Mos.	64.6	31.757	17.900	56.290	78,612,000	1.7681	0.0554
Schuylkill.....	7	1915.0	47.768	22.201	46.445	2,018,100,000	1.6312	0.0841
Sudbury, Mass.....	30	75.2	16.22	22.824	49.4	81,291,000	1.6873	0.0868
Croton, N. Y.....								

TABLE VII.—Comparative Daily Stream from 1904 and 1905.

Watersheds	Area of watershed.	MAXIMUM GALLONS.		Date.	MINIMUM GALLONS.		Date.
		Per Day.	Per Sq. Mile.		Per Day.	Per Sq. Mile.	
Perkiomen.....	152.0	3,680,000,000	24,250,000	January 7th	12,795,000	84,200	July 23.
Neshaminy.....	139.3	2,680,000,000	18,800,000	January 7th	4,202,000	30,170	July 21.
Tohickon.....	102.2	2,698,000,000	26,400,000	January 7th	1,616,000	15,900	July 18.
Wissahickon.....	64.6	1,126,800,000	17,443,000	January 7th	1,484,900	23,000	July 18.
Schuylkill.....	1915.0	18,640,000,000	9,734,000	January 7th			

ANNUAL REPORT
OF THE
BUREAU OF FILTRATION
FOR THE YEAR 1905.

DEPARTMENT OF PUBLIC WORKS
BUREAU OF FILTRATION

(Improvement, Extension and Filtration of the Water Supply)

OFFICERS, 1905.

Acting Chief Engineer,
GEO. S. WEBSTER.

First Assistant Engineers,
LAMONTE LLOYD.

- D. JONES LUCAS, In Charge Torresdale Filters.
S. M. SWAAB, In Charge Lardner's Point Pumping Stations.
T. NELSON SPENCER, In Charge Torresdale Intake.
SETH M. VAN LOAN, In Charge Lardner's Point Pipe Distribution System.
JOHN S. ELY, In Charge Belmont Pre-filters.
H. M. HILLEGAS, Inspector of Pumping Machinery.

Laboratory.

- GEORGE EDWARD THOMAS, Chemist in Charge.
ROBLEY D. NEWTON, Bacteriologist.

Testing Station.

- HAROLD C. STEVENS, Assistant Engineer in Charge.

Operation and Maintenance of Filters.

- CHESTON M. STUART, Assistant in Charge.

ANNUAL REPORT
OF THE
ACTING CHIEF ENGINEER
OF THE
BUREAU OF FILTRATION
FOR THE YEAR 1905

Philadelphia, December 31, 1905.

MR. A. LINCOLN ACKER,
Director, Department of Public Works.

DEAR SIR:—I have the honor to submit herewith Annual Report on the operations of the Bureau of Filtration for the year ending December 31, 1905.

Upon the resignation of Mr. John W. Hill, former Chief Engineer of the Bureau, June 15, 1905, Mr. George S. Webster, Chief Engineer of the Bureau of Surveys, was assigned as Acting Chief Engineer to take temporary charge.

Shortly after the resignation of the former Chief Engineer a Board of Engineers consisting of Major Cassius E. Gillette, William Barclay Parsons, and John Donald MacLennan, was appointed by his Honor, Mayor John Weaver, to investigate the Bureau.

On June 16, 1905, all work in connection with contracts at Torresdale, the Lardner's Point Pipe Distribution System, and the Preliminary Filters at Belmont, was suspended, and on June 20, Contract No. 50, for the Lateral

Collectors and Filtering Materials at Torresdale, was annulled by order of his Honor, the Mayor. Contract No. 31, Coal Handling Machinery and Pockets for Lardner's Point Pumping Stations Nos. 2 and 3, was suspended July 22, by order of the Director of the Department of Public Works. Work on these contracts is still under suspension pending the investigation of the Board of Engineers above mentioned.

For convenience of stating the matter relating to the work of the Bureau, the Report has been arranged as follows:

1. Financial Statement.
2. Operation of filters—Belmont and Roxborough, including resanding contracts.
3. Contracts:
 - Torresdale System.
 4. Filters—Contracts Nos. 25, 39, 50, 54 and 59.
 5. Intake—Contract No. 34.
 6. Pumping out of the Torresdale Conduit—Contract No. 81.
 7. Lardner's Point Pumping Stations and Machinery—Contracts Nos. 29, 68, 11, 67, 48, 45 and 31.
 8. Lardner's Point Pipe Distribution System—Contract No. 28.
 9. Oak Lane Reservoir—Contract No. 27.
 10. Belmont Preliminary Filters—Contract No. 39.
 11. Sand Washer Pumps and Boilers—Belmont—Contract No. 40-B.
- Electric Lighting System—Roxborough and Belmont.*
 12. Electric Lighting System for Upper and Lower Roxborough—Contract No. 44.

13. Electric Lighting Equipment for the Belmont Filters—Contract No. 46.
14. Laboratory.
15. Experimental Investigation—Preliminary Filter No. 12.
16. Influence of filtered water on typhoid fever case rates.
17. Appendices:
 - A—Table showing contracts to date, including amounts paid thereon.
 - B—Report of Experts on test of pumping machinery.

FINANCIAL STATEMENT.

The total fund provided by Councils for the Improvement, Extension and Filtration of the Water Supply, is as follows:

By ordinance of June 17 and July 12, 1898..	\$500,000.00
By ordinance of January 12, 1900	3,200,000.00
By ordinance of March 23, 1900	12,000,000.00
By ordinance of June 30, 1902	1,300,000.00
By ordinance of December 29, 1902	500,000.00
By ordinance of June 27, 1904	5,000,000.00
Total	\$22,500,000.00

Of the fund provided there has been paid out and charged off as limits of contracts to December 31, 1905, the following amounts:

Paid on completed contracts	\$7,034,318.90
Paid on uncompleted contracts	8,279,066.96
Limits of uncompleted contracts, less payments	3,440,143.04
Land damages	876,435.55
Expenses, supplies, advertisements, etc...	192,085.01
Inspections	17,177.89
Salaries and wages	793,361.91

Expended by Bureau of Water	1,013,149.89
Damages to property on account of pipe laying	18,123.55
Repaving over pipe trenches	81,264.51
Available balance	754,872.79
Total	\$22,500,000.00

APPROPRIATION FOR OPERATION AND MAINTENANCE OF FILTERS, 1905.

Upper and Lower Roxborough Filters.

Item 1.

Appropriated, December 31, 1904	\$4,371.07
Transferred June 14	15,000.00
Transferred November 16	3,000.00
Total	\$22,371.07
Expended for operation and maintenance	21,446.43
Amount merging	\$924.64

Belmont Filters.

Item 2.

Appropriated December 31, 1904	11,105.29
Transferred June 14	15,000.00
Transferred November 16	4,000.00
Transferred December 28	500.00
Total	\$30,605.29
Expended for operation and maintenance	29,748.31
Amount merging	856.98

Land Appropriated.

The land appropriated for filters and other works comprises 471.738 acres, divided as shown below. Under the caption Land Damages is included the jurors' and experts' fees, and other legal expenses incident to the land takings.

Section.	Acres Appropriated	Land Damages and costs
Upper Roxborough	34.578	\$78,768.66
Shawmont Pumping Station, (account Bureau of Water)	2.800	16,810.13
Belmont	60.572	351,664.39
Torresdale	343.500	323,737.18
Lardner's Point	9.525	40,250.21
Oak Lane	20.823	65,204.98
Total		\$876,435.55

OPERATION OF FILTERS.

Lower Roxborough

During the year there were filtered at this Station 3,530,267,000 gallons of water, of a daily average of 9,627,000 gallons.

The total cost of operation, not including the cost of the wash water used in transporting and washing sand, was \$13,024.38, or \$3.69 per million gallons of water filtered.

The water at this Station before being applied to the final filters receives preliminary treatment by passing through roughing filters which remove the heavier suspended matter. It has therefore been feasible to obtain better results from higher rates of filtration than at other Stations where the water is passed through sedimentation basins only before being applied to the filters.

Considerable trouble was experienced by reason of air collecting in the effluent pipes, but this has been overcome by placing vent pipes in each of the regulating houses.

Filters Nos. 3 and 4 were resanded during the latter part of November and the early part of December. The efficiency of these filters was somewhat impaired after the sand was replaced, but after a short time the results became satisfactory.

The work of the preliminary filters has been quite satisfactory, the average percentage removal of turbidity being about 53 per cent.

Previous to May there had been no systematic flushing of these filters, and as a result they became considerably clogged. Since May, however, they have been flushed every two months by opening the 16-inch valve at the bottom, thus creating considerable downward velocity through the filters, which has resulted in keeping them in service without resorting to removal and washing of the sponge. It is

expected that it will be necessary to remove and wash the sponge early in the ensuing year.

In view of the fact that no sponge has been washed, which is perhaps the largest item of expense in connection with the operation of the preliminary filters at this Station, and that the attendance is supplied by the same men who are engaged on the final filters, it is difficult to give a statement of the actual cost of operation of the preliminary filters. When the sponge is removed during the ensuing year a fair statement can be made by taking this cost in connection with a proportionate estimate of the time of the attendants engaged in the work of operating the preliminary filters.

In the following table are given the average costs of scraping, removing and washing the sand for the years 1904 and 1905.

	1904	1905
Number of runs	26	46
Average cubic yards of sand scraped per run	120	66.65
Average million gallons filtered per run	123.7	75.356
Average million gallons filtered per acre per run	233.4	141.15
Average cubic yards of sand scraped per million gallons of water filtered	0.97	0.8845
<hr/>		
Average cost to scrape per cubic yard of sand	\$0.21	\$0.19
Average cost to remove per cubic yard of sand27	.25
Average cost to wash per cubic yard of sand	20	.15
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Total cost per cubic yard of sand	\$0.68	\$0.59
Average gallons of water used per cubic yard of sand to remove ..	1,766	1,583
Average gallons of water used per cubic yard of sand to wash	2,501	1,819

Average cost per million gallons to scrape, remove and wash sand ..	\$0.668	\$0.521
Cost per million gallons of water to scrape, transport, wash and re- store sand	\$1.13	\$0.79

It will be seen from the above statement that the cost of scraping, transporting and washing the sand for 1905 was less than for the preceding year, although the average yield of the filters per run was less. This is partly due to the fact that the scrapings were not so heavy and the quantity of sand handled per million gallons of water filtered less.

In considering the cost of operation as stated in this report, there is no charge made for interest and depreciation, and the cost of water used in the operation of the plant is estimated at \$15 per million gallons. This figure is used in computing the cost at the three Stations now in operation, because it admits of better comparison of the other items entering into the expense.

The replacing of the sand in the filters has been done by contract, as the force employed at the various filter stations is not sufficient to keep the filters clean and restore the sand at the same time. The result has been considerable reduction in the cost of this work. The following table gives the number of filters resanded, the quantity of sand replaced, and the cost:

Date, 1905	Filter No.	Cubic Yds. Replaced	Total Cost of Replacing	Cost per Cu. Yd.
11-27 to 12-5	3	996.20	\$298.80	\$0.30
12-5 to 12-11	4	942.3	282.69	0.30

In stating the efficiency of the filters, the first comparison is made with the work of the final filters, showing the reduction of the bacteria and turbidity in the applied water as it is received from the preliminary filters, which is as follows:

	Percentage removed.
Average reduction, turbidity	91.65
Average reduction, bacteria	98.38
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.85
Minimum reduction, turbidity	50.00
Minimum reduction, bacteria	95.05

In the following a comparison is made showing the reduction of the bacteria and turbidity in the water received from the Schuylkill river. This is the work of the combined plant, consisting of a sedimentation basin, where the water is allowed to stand for an average period of one and one-half days, the preliminary filters and the final filters.

	Percentage removed.
Average reduction, turbidity	97.47
Average reduction, bacteria	99.81
Maximum reduction, turbidity	100.00
Maximum reduction, bacteria	99.99
Minimum reduction, turbidity	75.00
Minimum reduction, bacteria	99.24

In the following tables are given the results of operation of all filters for the year 1905:

Weekly Averages of Bacteria and Turbidity of Filters at Lower Roxborough, for the Year 1905.

	WEEK ENDING.													
	JAN. 7.		JAN. 14.		JAN. 21.		JAN. 28.		FEB. 4.		FEB. 11.		FEB. 18.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	11	30,000	110	46,000	14	28,000	5	8,700	3	11,000	8	12,000	3	11,000
* Pre-filters.....	5	9,000	60	18,000	8	9,200	2	2,900	2	4,400	1	4,700	1	7,400
Filter No. 1.....	2	400	3	660	0.5	120	0.5	32	.....	.....	0.5	78	0.5	650
Filter No. 2.....	0.5	29	1	71	0.5	230	0.5	27	0.5	27	0.5	200	0.5	210
Filter No. 3.....	0.5	36	1	110	0.5	190	0.5	15	0.5	17	0.5	28	0.5	75
Filter No. 4.....	1	190	2	130	0.5	67	0.5	45	0.5	71	0.5	390	0.5	470
Filter No. 5.....	1	180	2	210	0.5	68	0.5	89	0.5	35	0.5	82	0.5	500
Average of filters.....	1	170	2	240	0.5	140	0.5	32	0.5	38	0.5	154	0.5	390
Filtered water basin.....	1	200	3	100	0.5	38	0.5	21	0.5	34	1	77	0.5	38

* Applied to final filters

Lower Roxborough Filters—Continued.

	WEEK ENDING.													
	FEB. 25.		MARCH 4.		MARCH 11.		MARCH 18.		MARCH 25.		APRIL 1.		APRIL 8.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water	3	4,400	6	9,800	14	22,800	27	57,000	62	15,000	43	13,000	9	10,000
*Pre-filters	1	2,300	2	4,400	.....	.....	13	37,000	26	6,600	28	5,900	5	4,700
Filter No. 1.....	0.5	190	0.5	120	0.5	110	1	120	0.5	49	0.5	77	0.5	88
Filter No. 2.....	0.5	390	0.5	18	0.5	380	1	920	1	77	0.5	63	0.5	48
Filter No. 3.....	0.5	280	0.5	54	0.5	170	1	130	0.5	70	0.5	58	0.5	55
Filter No. 4.....	0.5	740	0.5	69	0.5	28	0.5	550	1	66	0.5	66	0.5	36
Filter No. 5.....	0.5	900	0.5	33	0.5	210	1	410	1	61	0.5	53	0.5	34
Average of filters.....	0.5	500	0.5	59	0.5	180	1	490	1	65	0.5	63	0.5	52
Filtered water basin.....	0.5	53	0.5	83	0.5	70	1	57	1	53	0.5	68	0.5	57

* Applied to final filters.

Lower Roxborough Filters.—Continued.

	WEEK ENDING.													
	APRIL 15.		APRIL 22.		APRIL 29.		MAY 6.		MAY 13.		MAY 20.		MAY 27.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	9	6,400	8	4,000	8	3,900	8	6,900	6	2,000	5	4,300	4	4,500
*Pre-filters.....	4	3,100	4	2,400	3	2,300	3	2,300	3	1,400	2	1,800	1	1,800
Filter No. 1.....	0.5	110	0.5	89	0.5	100	0+	68	0+	38	0+	23	0+	34
Filter No. 2.....	0.5	62	0.5	82	0.5	45	0.5	23	0+	16	0+	13	0+	20
Filter No. 3.....	0.5	50	0.5	66	0.5	99	0+	160	0+	69	0.5	31	0+	23
Filter No. 4.....	0.5	58	0.5	88	0	200	0+	79	0+	31	0+	48	0+	140
Filter No. 5.....	0.5	63	0.5	68	0.5	62	0+	42	0+	57	0+	23	0+	12
Average of filters.....	0.5	70	0.5	79	0.5	101	0+	74	0+	38	0+	28	0+	46
Filtered water basin.....	0.5	75	0.5	91	0.5	80	0+	60	0+	64	0+	32	0+	34

* Applied to final filters.

Lower Roxborough Filters.—Continued.

	WEEK ENDING.													
	JUNE 3.		JUNE 10.		JUNE 17.		JUNE 24.		JULY 1.		JULY 8.		JULY 15.	
	Turb.	Pact.	Turb.	Bact.	Turb.	Bact.	Turb.	Pact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	4	3,000	5	3,400	4	2,400	4	2,000	4	1,000	4	740	4	1,200
*Pre-filters.....	1	1,500	1	1,300	1	1,100	1	1,800	2	1,400	1	870	1	840
Filter No. 1.....	0+	29	0+	68	0+	9	0+	22	0+	25	0+	15	0+	14
Filter No. 2.....	0+	24	0+	63	0+	23	0+	16	0+	20	0+	22	0+	19
Filter No. 3.....	0+	14	0+	14	0+	24	0+	29	0+	25	0+	17	0+	18
Filter No. 4.....	0+	52	0+	28	0+	23	0+	79	0+	22	0+	15	0+	21
Filter No. 5.....	0+	9	0+	8	0+	13	0+	13	0+	18	0+	21	0+	19
Average of filters.....	0+	26	0+	36	0+	18	0+	32	0+	24	0+	18	0+	18
Filtered water basin.....	0+	50	0+	53	0+	37	0.5	33	0+	29	0+	43	0+	28

* Applied to final filters.

Lower Roxborough Filters—Continued.

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	WEEK ENDING.													
	JULY 22.		JULY 29.		AUGUST 5.		AUGUST 12.		AUGUST 19.		AUGUST 26.		SEPT. 2.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water	6	1,800	6	3,500	4	1,200	22	2,700	82	6,000	21	7,800	26	8,700
*Pre-filters.....	2	680	1	680	1	710	7	1,000	49	3,100	12	2,900	18	3,200
Filter No. 1.....	0+	16	0+	14	0+	15	0+	14	0+	41	0+	36	0.5	17
Filter No. 2.....	0+	33	0+	18	0+	12	0+	9	0+	10	0+	10	0+	16
Filter No. 3.....	0+	22	0+	28	0.5	24	0+	18	0+	32	0+	68	0.5	20
Filter No. 4.....	0+	27	0+	29	0+	27	0+	67	1	35	0+	14	0+	21
Filter No. 5.....	0.5	15	0+	12	0+	11	0+	11	1	25	0.5	9	0.5	14
Average of filters.....	0+	33	0+	20	0+	18	0+	24	0.5	29	0+	26	0.5	18
Filtered water basin.....	0+	29	0+	35	0+	27	0+	10	0+	20	0+	15	0.5	21

* Applied to final filters.

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Lower Roxborough Filters.—Continued.

	WEEK ENDING.													
	SEPT. 9.		SEPT. 16.		SEPT. 23.		SEPT. 30.		OCT. 7.		OCT. 14.		OCT. 21.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	42	7,000	16	5,500	11	4,400	12	9,400	9	10,000	11	9,800	23	6,500
*Pre-filters.....	17	2,600	9	2,200	4	1,700	5	4,600	4	4,700	5	3,500	10	2,400
Filter No. 1.....	0+	14	0+	7	0+	23	0+	10	0+	6	0+	5	0+	6
Filter No. 2.....	0+	24	0+	7	0+	13	0+	11	0+	7	0+	4	0+	9
Filter No. 3.....	0+	18	0+	11	0+	11	0+	9	0+	10	0+	14	0+	34
Filter No. 4.....	0+	38	0+	34	0+	18	0+	13	0+	18	0+	65	0+	15
Filter No. 5.....	0+	50	0.5	12	0+	11	0+	12	0+	12	0+	6	0+	6
Average of filters.....	0+	31	0+	14	0+	15	0+	11	0+	11	0+	19	0+	14
Filtered water basin.....	0+	20	0+	16	0+	26	0+	12	0+	15	0+	31	0+	17

* Applied to final filters.

Lower Roxborough Filters.—Continued.

	WEEK ENDING.													
	OCTOBER 28.		Nov. 4.		Nov. 11.		Nov. 18.		Nov. 25.		DEC. 2.		DEC. 9.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	28	7,600	9	3,800	9	11,000	10	12,000	7	24,000	20	55,000	74	31,000
*Pre-filters.....	17	3,200	5	1,400	4	3,700	5	6,300	4	15,000	12	19,000	44	17,000
Filter No. 1.....	0+	6	0+	13	0+	7	0+	12	0+	16	0+	10	0+	20
Filter No. 2.....	0.5	24	0+	7	0+	5	0+	18	0+	350	0+	92	1	140
Filter No. 3.....	0.5	17	0+	6	0+	4	0+	7	0+	14	.....	.....	0+	.....
Filter No. 4.....	0+	13	0+	7	0+	15	0+	300	0+	75	0+	31	.....	.....
Filter No. 5.....	0+	11	0+	11	0+	9	0+	56	0+	69	0+	87	1	200
Average of filters.....	0+	14	0+	9	0+	8	0+	79	0+	106	0+	55	0.5	120
Filtered water basin.....	0+	29	0+	12	0+	8	0+	17	0+	68	0+	56	1	170

* Applied to final filters.

Lower Roxborough Filters—Continued.

	WEEK ENDING.						AVERAGES FOR THE YEAR.	
	DEC 16.		DEC. 23.		DEC. 30.			
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	15	13,000	40	37,000	33	51,000	18	12,600
*Pre-filters.....	8	7,200	25	28,000	27	26,000	9	5,900
Filter No. 1.....	0+	100	0.5	420	2	220	0.5	86
Filter No. 2.....	0+	52	0+	46	0.5	89	0.5	81
Filter No. 3.....	0.5	520	0.5	1,300	3	770	0.5	97
Filter No. 4.....	0.5	1,000	0+	780	2	1,200	0.5	150
Filter No. 5.....	0.5	53	0+	19	0+	88	0.5	78
Average of filters.....	0.5	340	0+	510	2	460	0.5	98
Filtered water basin.....	1	93	†0+	†95	†1	†37	0.5	49

*Applied to filters.

†Mixed with water from Upper Roxborough filtered water basin.

Upper Roxborough.

The Upper Roxborough filters have a capacity of 20,000,000 gallons per day, at a rate of 3,000,000 gallons per acre per day. It has been impossible to operate these filters at their full capacity on account of the inability to supply them with the required quantity of water from the Shawmont Pumping Station.

The total quantity of water filtered during the year was 3,681,423,000 gallons, or a daily average of 10,096,000 gallons.

The total cost of operating these filters was \$16,776.43, which divided by the total yield gives a cost of \$4.56 per million gallons of water filtered. This cost covers all the items connected with the operation of the filters with the exception of the cost of the coal consumed at the Roxborough Auxiliary Pumping Station, where the water is pumped from the Upper Roxborough Reservoir on to the filters. This Pumping Station is a combined low-service and high-service station, and the making of the steam is under the supervision of the Bureau of Water, and the coal for this purpose is purchased from funds appropriated to that Bureau.

Breaks in the 48-inch pipe in Eva street near Summit avenue necessitated the shutting down of the entire plant February 1 and 2, and again November 16 to 19. During these periods the districts were supplied with sedimented water from the Upper Roxborough Reservoir.

As will be seen from the tabulated reports showing the results of the work of the filters during the latter part of February, the bacterial efficiency was apparently low. It is believed that the samples of the filtered water were improperly collected during this period. The unfavorable results during April were thought to be due to bacterial growths in the underdrains. This was rectified by drain-

ing the filters, and allowing them to stand for a number of days, and when again put in service the results were satisfactory.

In the following table are given the average costs of scraping, removing and washing sand for the years 1904 and 1905.

	1904	1905
Number of runs	43	35
Average cubic yards of sand scraped per run	117.75	85.05
Average million gallons filtered per run	78.337	105.898
Average million gallons filtered per acre per run	108.93	151.
Average cubic yards of sand scraped per million gallons of water filtered	1.503	0.8032
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Average cost to scrape per cubic yard of sand	\$0.26	\$0.18
Average cost to remove per cubic yard of sand30	.22
Average cost to wash per cubic yard of sand15	.09
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Total cost per cubic yard of sand ..	\$0.71	\$0.49
Average gallons of water used per cubic yard of sand to remove ...	1,874	1,518
Average gallons of water used per cubic yard of sand to wash	1,443	1,526
Average cost per million gallons to scrape, remove and wash	\$0.93	\$0.39
Cost per million gallons of water to scrape, transport, wash and restore sand	\$1.85	\$0.63

It is gratifying to note the decrease in the cost per million gallons filtered as compared with the year 1904. If it were possible to operate this plant up to its full capacity, the cost would be still less, as the filter attendance and other items of expense would remain practically the same.

Filter No. 5 was resanded under Contract No. 80:

Date, 1905	Filter No.	Cubic Yds. Replaced	Total Cost of Replacing	Cost per Cub. Yd
1-12 to 12-22	5	1055.60	316.68	\$0.30

The efficiency of the filters during the year was all that could be desired.

Comparing the work of the filters, based on the bacteria and turbidity reductions in the water as received from the Upper Roxborough Reservoir, the results were as follows:

	Percentage removed.
Average reduction, turbidity	98.
Average reduction, bacteria	89.95
Maximum reduction, turbidity	100.
Maximum reduction, bacteria	99.79
Minimum reduction, turbidity	87.50
Minimum reduction, bacteria	66.50

There were lower bacterial reductions than above stated, but these occurred during the periods referred to when the work of the filters was impaired by the bacterial growth in the underdrains.

Comparing the effluent of the filters with the water pumped from the Schuylkill river, the reduction was as follows:

	Percentage removed.
Average reduction, turbidity	97.99
Average reduction, bacteria	99.77
Maximum reduction, turbidity	100.
Maximum reduction, bacteria	99.99
Minimum reduction, turbidity	87.50
Minimum reduction, bacteria	98.64

It should be borne in mind that the percentage removal above stated is the combined work of the sedimentation reservoir and the filters. The average period of sedimentation in the Upper Roxborough Reservoir was approximately twelve days.

In the following table are given the results of operation of all the filters for the year 1905.

Weekly Averages of Bacteria and Turbidity of Filters at Upper Roxborough for the year 1905.

	WEEK ENDING.													
	JANUARY 7.		JANUARY 14.		JANUARY 21.		JANUARY 28.		FEB. 4.		FEB. 11.		FEB. 18.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	14	15,000	69	20,000	82	14,000	9	3,600	6	4,200	4	4,800	4	6,700
Filter No. 1.....	0.5	40	1	60	0.5	41	0.5	19	0.5	52	0.5	45	0.5	770
Filter No. 2.....	0.5	58	2	100	1	94	0.5	13	0.5	18	0.5	17	0.5	150
Filter No. 3.....	0.5	82	1	48	0.5	28	0.5	10	0.5	16	0.5	22	0.5	67
Filter No. 4.....	0.5	71	2	200	1	82	0.5	22	0.5	59	0.5	18	0.5	160
Filter No. 5.....	0.5	56	2	160	1	64	0.5	15	0.5	15	0.5	27	0.5	1,200
Filter No. 6.....	0.5	51	1	68	1	41	0.5	17	0.5	10	0.5	25	0.5	57
Filter No. 7.....	0.5	52	0.5	50	0.5	68	0.5	32	0.5	30	0.5	24	0.5	860
Filter No. 8.....	0.5	36	1	60	1	46	0.5	23	0.5	31	0.5	25	0.5	270
Average of filters.....	0.5	50	1	100	1	58	0.5	19	0.5	29	0.5	25	0.5	380
Filtered water basin.....	0.5	72	2	140	1	77	0.5	25	0.5	22	0.5	24	0.5	29

Upper Roxborough Filters—Continued.

	WEEK ENDING.													
	FEB. 25.		MAR. 4.		MAR. 11.		MAR. 18.		MAR. 25.		APRIL 1.		APRIL 8.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	5	3,200	5	4,000	8	5,000	17	8,800	32	2,100	32	2,300	15	900
Filter No. 1.....	0.5	960	0.5	35	0.5	33	0.5	51	0.5	45	0.5	100	0.5	290
Filter No. 2.....	0.5	510	0.5	11	0.5	22	0.5	41	0.5	41	0.5	46	0.5	48
Filter No. 3.....	0.5	200	0.5	13	0.5	20	0.5	45	0.5	40	0.5	120	0.5	320
Filter No. 4.....	0.5	370	0.5	18	0.5	24	0.5	42	0.5	45	0.5	70	0.5	140
Filter No. 5.....	0.5	420	0.5	7	0.5	12	0.5	25	0.5	28	0.5	33	0.5	49
Filter No. 6.....	0.5	170	0.5	18	0.5	20	0.5	36	0.5	32	0.5	41	0.5	35
Filter No. 7.....	0.5	500	0.5	16	0.5	22	0.5	36	0.5	37	0.5	60	0.5	45
Filter No. 8.....	0.5	180	0.5	12	0.5	15	0.5	22	0.5	34	0.5	50	0.5	50
Average of filters.....	0.5	430	0.5	16	0.5	21	0.5	37	0.5	38	0.5	65	0.5	120
Filtered water basin.....	0.5	12	0.5	10	0.5	20	0.5	45	0.5	46	0.5	78	0.5	84

Upper Roxborough Filters—Continued.

	WEEK ENDING.													
	APRIL 15.		APRIL 22.		APRIL 29.		MAY 6.		MAY 13.		MAY 20.		MAY 27.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	14	1,300	16	960	11	400	9	220	8	170	6	290	6	320
Filter No. 1	0.5	500	0.5	350	0+	330	0+	310	.....	.....	.....	.....	0+	78
Filter No. 2	0.5	110	0.5	310	0+	540	0+	400	0+	200	0+	92	0+	49
Filter No. 3	0.5	270	0.5	240	0+	140	0+	59	0.5	46	0+	36	0+	59
Filter No. 4	0.5	270	0.5	270	0+	220	0+	220	.....	.....	.....	.....	0+	70
Filter No. 5	0.5	63	0.5	70	0.5	110	0+	140	0+	150	0+	88	0+	76
Filter No. 6	0.5	29	0.5	28	0.5	42	0+	54	.....	.....	.....	.....	.....	.....
Filter No. 7	0.5	48	0.5	63	0.5	150	0.5	210	.....	.....	.....	.....	.....	.....
Filter No. 8	0.5	130	0.5	300	0+	86	0+	410	0+	160	0+	160	0+	220
Average of filters	0.5	180	0.5	200	0+	300	0+	230	0+	140	0+	94	0+	92
Filtered water basin.....	0.5	140	0.5	150	0+	190	0+	200	0+	150	0+	97	0+	73

Upper Roxborough Filters—Continued.

	WEEK ENDING.													
	JUNE 3.		JUNE 10.		JUNE 17.		JUNE 24.		JULY 1.		JULY 8.		JULY 15.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	5	330	5	350	4	260	7	220	6	260	4	370	5	300
Filter No. 1.....	0+	78	0+	79	0+	54	0+	38	0+	29	0+	23	0+	23
Filter No. 2.....	0+						0+	36	0+	26	0+	20	0+	16
Filter No. 3.....							0.5	30	0.5	23	0+	16	0+	17
Filter No. 4.....	0+	54	0+	41	0+	37	0+	27						
Filter No. 5.....	0+	100	0+	79	0+	63		49						
Filter No. 6.....					1	94	0+	48	0+	29	0+	17	0+	13
Filter No. 7.....	0.5	75	0.5	59	0.5	31	0+	28	0.5	25	0.5	29	0.5	22
Filter No. 8.....							0+	32	0+	15	0+	13	0+	11
Average of filters.....	0+	77	0+	65	0.5	66	0+	36	0+	25	0+	20	0+	17
Filtered water basin.....	0+	68	0+	64	0+	45	0+	41	0+	28	0+	25	0+	24

Upper Roxborough Filters.—Continued.

	WEEK ENDING.													
	JULY 22.		JULY 29.		AUGUST 5.		AUGUST 12.		AUGUST 19.		AUGUST 26.		SEPT. 2.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	12	240	8	240	5	240	8	290	11	510	16	570	16	540
Filter No. 1.....	0+	21	0+	20	0+	30	0+	30	0+	22	0+	15	0+	19
Filter No. 2.....	0+	14	0+	15	0+	15	0+	18	0+	24	0+	36	0+	16
Filter No. 3.....	0+	15	0+	16	0+	14	0+	30	0+	17	0+	8	0+	8
Filter No. 4.....	0+	52	0+	41	0+	21	0+	19	0+	26	0+	26	0+	36
Filter No. 5.....	0+	57	0.5	30	0+	18	0+	22	0+	59	0+	51	0+	40
Filter No. 6.....	0+	13	0+	20	0+	33	0+	19	0+	22	0+	8	0+	12
Filter No. 7.....	0+	21	0+	99	0.5	26	0+	15	0.5	19	0.5	18	0.5	18
Filter No. 8.....	0+	9	0+	11	0+	11	0+	20	0+	10	0+	6	0+	8
Average of filters.....	0+	25	0+	33	0+	21	0+	22	0+	25	0+	21	0+	20
Filtered water basin.....	0+	23	0+	27	0+	25	0+	22	0+	31	0+	22	0+	23

Upper Roxborough Filters—Continued.

	WEEK ENDING.													
	SEPT. 9.		SEPT. 16.		SEPT. 23.		SEPT. 30.		OCTOBER 7.		OCTOBER 14.		OCTOBER 21.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	15	400	12	350	18	360	10	500	11	980	7	640	16	550
Filter No. 1.....	0+	16	0+	12	0+	14	0+	7	0+	9	0+	6	0+	8
Filter No. 2.....	0+	19	0+	12	0+	11	0+	7	0+	18	0+	7	0+	9
Filter No. 3.....	0+	10	0+	11	0+	8	0+	5	0+	6	0+	2	0+	5
Filter No. 4.....	0+	25	0+	95	0+	40	0+	12	0+	10	0+	7	0+	7
Filter No. 5.....	0+	42	0+	32	0+	33	0+	23	0+	23	0+	22	0+	19
Filter No. 6.....	0+	14	0+	16	0+	16	0+	11	0+	10	0+	7	0+	43
Filter No. 7.....	0+	28	0+	24	0+	23	0+	43	0+	22	0+	9	0+	6
Filter No. 8.....	0+	9	0+	9	0+	11	0+	9	0+	9	0+	9	0+	7
Average of filters.....	0+	20	0+	26	0+	20	0+	15	0+	13	0+	9	0+	13
Filtered water basin.....	0+	26	0+	20	0+	22	0+	18	0+	13	0+	9	0+	13

Upper Roxborough Filters—Continued.

	WEEK ENDING.													
	Oct. 28.		Nov. 4.		Nov. 11.		Nov. 18.		Nov. 25.		Dec. 2.		Dec. 9.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	14	670	11	510	11	700	8	520	4	1,400	7	5,000	42	12,000
Filter No. 1.....	0+	4	0+	3	0+	4	0+	5	0+	23	0+	100	1	290
Filter No. 2.....	0+	3	0+	5	0+	3	0+	3	0+	12	0+	17	0.5	120
Filter No. 3.....	0+	13	0+	7	0+	5	0+	4	0+	8	0+	12	0.5	68
Filter No. 4.....	0+	5	0+	5	0+	20	0+	10	0+	11	0+	16	0.5	70
Filter No. 5.....	0+	23	0+	25	.....								
Filter No. 6.....	0.5	31	0+	11	0+	5	0+	6	0+	11	0+	10	0.5	47
Filter No. 7.....	0+	9	0+	4	0+	8	0+	36	0+	57	0+	63	1	180
Filter No. 8.....	0+	9	0+	7	0+	6	0+	57	0+	44	0+	57	0.5	120
Average of filters.....	0+	12	0+	8	0+	7	0+	17	0+	25	0+	39	0.5	120
Filtered water ba-in.....	0+	12	0+	8	0+	10	0+	19	0+	28	0+	40	1	180

Upper Roxborough Filters—Continued.

	WEEK ENDING.						AVERAGE FOR THE YEAR.	
	Dec. 16.		Dec. 23.		Dec. 30.			
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	20	6,800	9	13,000	36	12,000	13	3,240
Filter No. 1.....	1	88	0.5	28	1	40	0+	105
Filter No. 2.....	1	220	0.5	60	1	88	0.5	73
Filter No. 3.....	0.5	50	0+	17	0+	15	0+	46
Filter No. 4.....	0.5	56	0+	18	0.5	19	0+	68
Filter No. 5.....					1	500	0.5	98
Filter No. 6.....	0.5	55	0+	84	1	69	0.5	83
Filter No. 7.....	1	62	0+	29	1	28	0.5	61
Filter No. 8.....	1	47	0+	19	0.5	17	0+	76
Average of filters....	1	83	0+	36	1	91	0+	70
Filtered water basin.....	1	88	0.5	38	0.5	38	0.5	52

Belmont.

The total yield of the Belmont Filters for the year was 9,582,126,000 gallons of filtered water, or a daily average of 26,252,000 gallons. The total cost of operation was \$39,604.33, or at the rate of \$4.13 per million gallons of water filtered.

In comparing this cost with the cost stated in the Report for 1904, viz., \$3.58 per million gallons of water filtered, it should be borne in mind that the latter figure does not cover all the items of expense for the year 1904. The coal for that year was furnished by the Bureau of Water, and no charge was made to this Bureau for the same. There was also considerable resanding of the filters during the year 1905, and no resanding during the previous year. Taking these facts into consideration, and that the plant is operated below its rated capacity, the cost for the past year has been kept within the lowest possible limits. The same condition exists at this Station as at Upper Roxborough, namely, inability to supply the filters with a sufficient quantity of water to operate them at their full capacity, but this condition will be overcome early in the ensuing year when the boilers and the boiler house at the Belmont Stations are completed.

The bacterial removal has been entirely satisfactory, with the exception of the latter part of February, when some trouble was encountered, as noted in the operation of the Upper Roxborough Filters, and again in December, when the effluents of the filters operating at a low loss of head contained a considerable number of bacteria.

Frame sand bins were constructed during the year, which have been of great benefit in keeping the sand properly stored in the courts.

The suction pipe to the sand washer pipes was disconnected with the effluent pipe, and connected with the supply

pipe to the filters, and sedimented instead of filtered water is used in washing the sand.

Air vents were placed on the pipes in the filter regulating houses, also on the effluent pipe near the Administration Building.

In the following table are given the average costs of scraping, removing and washing sand, for the years 1904 and 1905:

	1904.	1905.
Number of runs	66	154
Average cubic yards of sand scraped per run	124.1	98.61
Average million gallons filtered per run	76.555	62.872
Average million gallons filtered per acre per run	104.87	85.54
Average cubic yards of sand scraped per millions gallons of water filtered	1.621	1.5687
<hr/>		
Average cost to scrape per cubic yard of sand	\$0.27	\$0.21
Average cost to remove per cubic yard of sand .....	.28	.23
Average cost to wash per cubic yard of sand .....	.12	.09
<hr/>		
Total cost per cubic yard of sand ..	\$0.67	\$0.53
Average gallons of water used per cubic yard of sand to remove...	1,881	1,608
Average gallons of water used per cubic yard of sand to wash	1,718	1,933
Average cost per million gallons to scrape, remove and wash	\$1.086	\$0.825
Cost per million gallons of water to scrape, wash and restore sand .	\$1.89	\$1.25

It will be seen from the above that the filters did not yield as much per run during 1905 as during the preceding year, but the scrapings were not so heavy. This was also the case at Lower Roxborough. The cost was considerably reduced, and it is probable that greater economy could be

effected in the quantity of water by purchasing improved sand ejectors. The ejectors now in use are badly worn, and changes in the design which have been suggested by experience with these ejectors would effect considerable saving in the quantity of water used.

Sand was restored to the filters under Contracts Nos. 78 and 80. The effect of letting this work by contract resulted in considerable economy in this branch of the operations. By such method it is possible to operate the filters with a smaller force of men than otherwise. The following table gives the number of filters resanded, the quantity of sand replaced, and the cost:

Date 1905.	Filter No.	Cubic yards replaced.	Total cost of replacing.	Cost per cubic yard.
8-15 to 8-30.....	1	1915.9	\$478.98	\$.25
10- 5 to 10-13.....	2	1547.8	886.95	.25
11- 9 to 11-17.....	3	1111.6	325.14	.2925
11-17 to 11-25.....	4	1235.2	361.30	.2925
9-16 to 9-26.....	7	1454.3	363.58	.25
9- 9 to 9-16.....	8	1345.7	336.43	.25
8-30 to 9- 8.....	9	1473.8	368.45	.25
11- 1 to 11- 9.....	10	1345.4	393.53	.2925
9-26 to 10- 5.....	13	1463.5	365.88	.25
10-24 to 10-31.....	14	823.1	240.76	.2925
10-17 to 10-23.....	15	900.1	265.91	.2925

Comparing the effluent from the Belmont filters with the water flowing from the new Belmont Sedimentation Basin, the results were as follows:

	Percentage removed.
Average reduction, turbidity	96.04
Average reduction, bacteria	97.86
Maximum reduction, turbidity	100.
Maximum reduction, bacteria	99.83
Minimum reduction, turbidity	83.33
Minimum reduction, bacteria	88.21

Comparing the effluent of the plain sand filters and the water from the Schuylkill river, the reductions were as follows:

	Percentage removed.
Average reduction, turbidity	96.64
Average reduction, bacteria	99.
Maximum reduction, turbidity	100.
Maximum reduction, bacteria	99.94
Minimum reduction, turbidity	87.5
Minimum reduction, bacteria	92.38

In the following table are given the results of operation of all filters for the year 1905.

Weekly Averages of Bacteria and Turbidity of Filters at Belmont for the year 1905.

	WEEK ENDING.													
	JANUARY 7.		JANUARY 14.		JANUARY 21.		JANUARY 28.		FEB. 4.		FEB. 11.		FEB. 18.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	11	27,000	66	29,000	12	21,000	5	9,900	4	15,000	3	11,000	3	8,800
Filter No. 1.....	0.5	52	2	200	0.5	39	0.5	33	0.5	56	0.5	110	0.5	1,600
Filter No. 2.....	1	130	3	200	0.5	40	0.5	34	0.5	27	0.5	48	0.5	410
Filter No. 3.....	0.5	62	2	840	1	130	0.5	34	0.5	26	0.5	98	0.5	420
Filter No. 4.....	1	62	2	100	0.5	26	0.5	37	0.5	68	0.5	49	0.5	190
Filter No. 5.....	0.5	69	2	180	0.5	58	0.5	28	0.5	82	0.5	180	0.5	180
Filter No. 6.....	0.5	29	1	72	0.5	27	0.5	18	0.5	25	0.5	110	0.5	470
Filter No. 7.....	0.5	37	4	270	0.5	110	0.5	51	0.5	35	0.5	22	0.5	16
Filter No. 8.....	1	34	2	160	0.5	43	0.5	33	0.5	44	0.5	19	0.5	13
Filter No. 9.....	1	150	3	230	0.5	40	0.5	23	0.5	41	0.5	26	0.5	22
Filter No. 10.....	1	62	2	99	0.5	35	0.5	21	0.5	46	0.5	38	0.5	26
Filter No. 11.....	1	170	3	220	1	230	0.5	23	0.5	17	0.5	52	0.5	49
Filter No. 12.....	1	140	3	99	0.5	210	0.5	18	0.5	18	0.5	16		
Filter No. 13.....	1	95	5	470	1	450	0.5	230	0.5	170	0.5	72	0.5	45
Filter No. 14.....	1	450	4	310	1	230	0.5	29	0.5	29	0.5	170	0.5	580
Filter No. 15.....	1	360	3	170	1	360	0.5	35	0.5	23	0.5	170	0.5	370
Filter No. 16.....	1	130	3	200	0.5	56	0.5	20	0.5	22	0.5	390	0.5	890
Filter No. 17.....	1	120	3	290	0.5	69	0.5	23	0.6	490	0.5	280	0.5	890
Filter No. 18.....	1	140	3	170	0.5	36	0.5	22	0.5	95	0.5	57	0.5	520
Average of all filters.....	1	130	3	230	0.5	120	0.5	40	0.5	72	0.5	100	0.5	440
Filtered water basin.....	1	95	3	240	1	90	0.5	31	0.5	130	0.5	230	0.5	1,000

Belmont Filters—Continued.

	WEEK ENDING.													
	FEB. 25.		MAR. 4.		MAR. 11.		MAR. 18.		MAR. 25.		APRIL 1.		APRIL 8.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	3	2,800	5	5,700	16	14,000	28	34,000	72	13,000	45	17,000	11	10,000
Filter No. 1.....	0.5	290	0.5	11	0.5	13	1	57	2	39	0.5	35	0.5	35
Filter No. 2.....	0.5	180	0.5	12	0.5	23	0.5	35	1	29	1	44	0.5	25
Filter No. 3.....	0.5	28	0.5	33	0.5	48	2	100	2	37	1	41	0.5	38
Filter No. 4.....	0.5	460	0.5	12	0.5	15	1	120	2	49	0.5	40	0.5	30
Filter No. 5.....	0.5	30	0.5	26	0.5	28	1	63	2	45	1	47	0.5	30
Filter No. 6.....	0.5	450	0.5	8	0.5	18	1	47	1	33	1	40	0.5	32
Filter No. 7.....	0.5	9	0.5	16	0.5	59	2	200	2	44	0.5	50	0.5	47
Filter No. 8.....	0.5	7	0.5	7	0.5	14	1	36	2	38	1	43	0.5	48
Filter No. 9.....	0.5	9	0.5	8	0.5	17	1	38	2	34	1	33	0.5	39
Filter No. 10.....	0.5	11	0.5	11	0.5	18	1	57	1	41	1	43	0.5	28
Filter No. 11.....	0.5	13	0.5	16	0.5	17	1	37	2	57	0.5	60	0.5	49
Filter No. 12.....	0.5	9	0.5	11	0.5	35	2	170	1	47	1	35	0.5	23
Filter No. 13.....	0.5	16	0.5	15	0.5	53	2	510	2	47	1	53	0.5	35
Filter No. 14.....	0.5	140	0.5	14	0.5	31	2	190	2	62	0.5	59	0.5	180
Filter No. 15.....	0.5	200	0.5	17	0.5	21	1	61	1	40	1	55	0.5	50
Filter No. 16.....	0.5	230	0.5	19	1	32	1	160	1	52	1	65	0.5	40
Filter No. 17.....	0.5	54	0.5	48	0.5	30	2	100	1	35	1	50	0.5	32
Filter No. 18.....	0.5	150	0.5	9	0.5	20	1	55	2	46	1	63	0.5	53
Average of all filters.....	0.5	130	0.5	20	0.5	27	1	110	2	43	1	49	0.5	46
Filtered water basin.....	0.5	330	0.5	30	0.5	46	1	260	2	51	1	51	0.5	45

Belmont Filters—Continued.

	WEEK ENDING.													
	APRIL 15.		APRIL 22.		APRIL 29.		MAY 6.		MAY 13.		MAY 20.		MAY 27.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	9	6,800	11	4,100	8	3,100	8	4,300	6	2,200	6	2,500	5	1,700
Filter No. 1.....	0.5	61	0.5	42	0+	48	0+	57	0+	55	0+	35	0+	50
Filter No. 2.....	0.5	37	0.5	51	0.5	42	0.5	53	0.5	76	0+	58	0+	32
Filter No. 3.....	0.5	45	0.5	37	0+	41	0+	51	0+	69	0+	24	0.5	32
Filter No. 4.....	0.5	33	0.5	36	0+	62	0.5	36	0+	31	0+	35	0+	47
Filter No. 5.....	0.5	280	0.5	160	0.5	79	0.5	97	0.5	110	0+	80	0+	38
Filter No. 6.....	0.5	41	0.5	48	0.5	99	0+	160	0.5	87	0+	98	0.5	190
Filter No. 7.....	0.5	25	0.5	25	0+	26	0+	110	0.5	72	0+	67	0+	85
Filter No. 8.....	1	36	0.5	23	0.5	35	0.5	87	0.5	60	0.5	33	0.5	42
Filter No. 9.....	0.5	31	0.5	22	0.5	19	1	21	0.5	26	0.5	23	0.5	32
Filter No. 10.....	0.5	31	0.5	23	0.5	45	1	42	0+	67	0.5	86	0+	200
Filter No. 11.....	0.5	34	0.5	37	0+	71	0+	150	0.5	97	0+	36	0+	30
Filter No. 12.....	0.5	24	0.5	16	0.5	25	0.5	37	0+	71	0+	31	0.5	21
Filter No. 13.....	0.5	23	0.5	14	0.5	49	0.5	32	0+	50	0+	72	0+	98
Filter No. 14.....	0.5	45	0.5	24	0.5	20	0.5	32	0+	54	0+	74	0+	40
Filter No. 15.....	0.5	93	0.5	37	0+	41	0+	52	0+	77	0+	69	0+	31
Filter No. 16.....	0.5	36	0.5	23	0.5	30	0+	40	0+	42	0+	47	0+	56
Filter No. 17.....	0.5	35	0.5	24	0.5	21	0.5	52	0.5	41	0+	45	0+	54
Filter No. 18.....	0.5	45	0.5	33	0.5	55	0.5	67	0+	74	0+	67	0+	140
Average of all filters.....	0.5	55	0.5	38	0.5	45	0.5	62	0+	64	0+	54	0+	68
Filtered water basin.....	0.5	30	0.5	29	0.5	45	0.5	55	0+	65	0+	52	0.5	63

Belmont Filters—Continued.

	WEEK ENDING.													
	JUNE 3.		JUNE 10.		JUNE 17.		JUNE 24.		JULY 1.		JULY 8.		JULY 15.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	5	1,400	4	900	4	1,600	4	1,600	4	1,500	4	880	4	710
Filter No. 1.....	0 †	52	0 †	55	0 †	54	0 †	83	0 †	20	0 †	19	0 †	12
Filter No. 2.....	0 †	27	0.5	80	0 †	50	0 †	82	0 †	22	0 †	82	0 †	85
Filter No. 3.....	0.5	87	0.5	25	0 †	21	0 †	24	0 †	21	0 †	65	0 †	18
Filter No. 4.....	0 †	40	0 †	80	0 †	23	0 †	48	0 †	56	0 †	50	0 †	37
Filter No. 5.....	0.5	26	0.5	80	0 †	46	0.5	19	0 †	58	0.5	85	0 †	57
Filter No. 6.....	0 †	110	0 †	74	0 †	86	0 †	210	0 †	24	0.5	22	0.5	19
Filter No. 7.....	0 †	80	0 †	75	0 †	51	0 †	85	0 †	54	0.5	59	0 †	78
Filter No. 8.....	0.5	57	0.5	47	0 †	28	0 †	35	0.5	57	0.5	34	0.5	25
Filter No. 9.....	0.5	42	0.5	82	0.5	25	0.5	24	0 †	39	0.5	38	0.5	110
Filter No. 10.....	0.5	95	0.5	89	0.5	81	0.5	29	0.5	52	0.5	85	0.5	92
Filter No. 11.....	0 †	38	0 †	44	0 †	37	0 †	26	0 †	36	0 †	83	0 †	44
Filter No. 12.....	0.5	27	0 †	58	0 †	34	0 †	19	0 †	30	0 †	41	0 †	88
Filter No. 13.....	0 †	54	0 †	47	0 †	42	0 †	24	0 †	28	0 †	86	0 †	90
Filter No. 14.....	0 †	44	0 †	49	0 †	88	0 †	61	0 †	100	0 †	120	0 †	37
Filter No. 15.....	0 †	47	0 †	43	0 †	82	0 †	85	0 †	58	0 †	160	0 †	100
Filter No. 16.....	0 †	70	0 †	88	0 †	33	0 †	56	0 †	47	0 †	18	0 †	32
Filter No. 17.....	0 †	50	0 †	82	0 †	24	0 †	20	0 †	34	0 †	78	0 †	55
Filter No. 18.....	0 †	55	0 †	86	0 †	51	0 †	27	0 †	20	0 †	19	0 †	28
Average of all filters.....	0 †	53	0 †	49	0 †	80	0 †	45	0 †	41	0 †	50	0 †	53
Filtered water basin.....	0 †	60	0 †	50	0 †	45	0 †	34	0.5	32	0.5	50	0 †	68

Belmont Filters—Continued.

	WEEK ENDING.													
	JULY 22.		JULY 29.		AUGUST 5.		AUGUST 12.		AUGUST 19.		AUGUST 26.		SEPT. 2.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	4	570	8	620	4	330	12	1,100	53	2,900	29	2,700	19	2,800
Filter No. 1.....	0+	10	0+	10	.....	.....	.....	.....	.....	.....	.....	.....	0+	1,100
Filter No. 2.....	0+	49	0+	58	0+	52	0+	16	0+	26	1	31	0.5	62
Filter No. 3.....	0+	18	0.5	26	0+	18	0+	20	0+	17	0.5	21	0.5	18
Filter No. 4.....	0+	32	0+	40	0+	9	0+	18	0+	79	0.5	66	0.5	38
Filter No. 5.....	0+	34	0+	24	0+	25	0.5	20	0.5	18	1	24	0.5	32
Filter No. 6.....	0+	20	0.5	32	0+	19	0+	17	0+	22	0.5	79	0.5	25
Filter No. 7.....	0+	74	0+	16	0+	10	0+	37	0+	66	0+	150	0+	24
Filter No. 8.....	0+	40	0.5	48	0.5	34	0+	31	0.5	24	1	23	0.5	32
Filter No. 9.....	0+	45	0.5	44	0.5	13	0.5	11	0.5	35	0.5	61	.....	.....
Filter No. 10.....	0+	81	0+	51	0+	16	0.5	30	0+	91	0.5	19	0.5	38
Filter No. 11.....	0+	52	0+	41	0+	27	0+	150	0+	31	0.5	14	0.5	14
Filter No. 12.....	0+	84	0+	62	0+	26	0+	16	0+	26	1	100	0.5	68
Filter No. 13.....	0+	64	0+	120	0+	44	0+	27	0+	48	0.5	16	0.5	27
Filter No. 14.....	0+	19	0+	39	0+	23	0+	27	0+	34	0.5	40	0.5	40
Filter No. 15.....	0+	17	0+	27	0+	22	0+	28	0+	51	0.5	38	0.5	32
Filter No. 16.....	0+	45	0+	56	0+	41	0+	37	0+	130	0.5	24	0+	15
Filter No. 17.....	0+	120	0+	100	0+	40	0+	140	0+	34	0.5	21	0.5	29
Filter No. 18.....	0+	58	0+	52	0+	35	0+	16	0+	25	0.5	23	0.5	36
Average of all filters.....	0+	48	0+	47	0+	28	0+	33	0+	45	0.5	49	0.5	96
Filtered water basin.....	0+	40	0+	41	0+	27	0+	25	0+	38	0.5	28	0.5	31

Belmont Filters—Continued.

	WEEK ENDING.													
	SEPT. 9.		SEPT. 16.		SEPT. 23.		SEPT. 30.		OCTOBER 7.		OCTOBER 14.		OCTOBER 21.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	25	4,500	14	4,000	11	4,100	12	2,800	7	4,200	8	4,800	18	3,900
Filter No. 1.....	0.5	97	0+	20	0+	10	0+	9	0+	13	0+	26	0+	21
Filter No. 2.....	0.5	110	0.5	41	0+	14	0+	14	0+	16	.....	.....	0.5	150
Filter No. 3.....	0.5	19	0.5	180	0+	16	0+	10	0+	9	0+	10	0+	12
Filter No. 4.....	0.5	30	0.5	52	0.	19	0.	16	0+	15	0+	16	0.5	47
Filter No. 5.....	0.5	45	1	86	0.5	17	0+	11	0+	8	0+	10	0.5	30
Filter No. 6.....	0.5	24	0.5	8	0.5	17	0+	27	0.	41	0+	51	0+	13
Filter No. 7.....	0+	17	0+	8	.....	.....	0+	420	0+	18	0+	8	0+	9
Filter No. 8.....	0.5	40	.....	.....	1	170	0.5	18	0+	10	0+	6	0+	16
Filter No. 9.....	.....	.....	2	230	0.5	18	0.5	10	0+	7	0+	8	0.5	11
Filter No. 10.....	0.5	23	0.5	9	0+	16	0+	25	0+	54	0.	11	0+	8
Filter No. 11.....	0.5	19	0+	43	0.	35	0+	290	0+	28	0.	12	0+	9
Filter No. 12.....	0.5	31	0+	16	0+	16	0+	10	0+	16	0+	52	0.5	30
Filter No. 13.....	0.5	45	0+	54	0.	35	.....	.....	0.5	1,400	0+	130	0+	18
Filter No. 14.....	0+	43	0+	48	0.	280	0.	31	0+	13	0+	8	0+	11
Filter No. 15.....	0+	160	0+	35	0+	21	0.	17	0+	14	0+	13	.....	.....
Filter No. 16.....	0.5	15	0+	23	0.	33	0.	27	0+	65	0.	17	0+	12
Filter No. 17.....	0.	47	0.	68	0+	42	0.	19	0+	13	0.	42	0+	35
Filter No. 18.....	0.5	57	0+	29	0.	17	0+	20	0+	22	0.	12	0+	10
Average of all filters.....	0.5	47	0.5	56	0+	46	0+	57	0+	98	0+	26	0+	27
Filtered water basin.....	0.5	58	0.5	48	0+	23	0+	23	0+	17	0+	22	0.5	20

Belmont Filters—Continued.

	WEEK ENDING.													
	OCTOBER 28.		Nov. 4.		Nov. 11.		Nov. 18.		Nov. 25.		DEC. 2.		DEC. 9.	
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.
Applied water.....	27	4,900	9	3,700	9	7,900	10	14,000	7	18,000	28	45,000	76	51,000
Filter No. 1.....	0+	50	0+	24	0+	12	0+	15	0+	25	0+	14	0+	32
Filter No. 2.....	0.5	23	0+	10	0+	10	0+	9	0+	17	0+	90	1	240
Filter No. 3.....	0.5	59	0.5	24	0+	20	.....	.....	0+	100	0+	120	1	310
Filter No. 4.....	0.5	49	0+	13	0+	16	0+	20	.....	.....	0+	190	1	460
Filter No. 5.....	0.5	13	0.5	9	0+	10	0+	11	0+	34	0+	88	1	300
Filter No. 6.....	0+	9	0+	6	0+	6	0+	210	0+	100	0+	63	1	160
Filter No. 7.....	0+	11	0+	10	0+	35	0+	27	0+	21	0+	120	0.5	140
Filter No. 8.....	0.5	12	0.5	6	0+	6	0+	7	0+	22	0+	9	0.5	140
Filter No. 9.....	0.5	11	0.5	18	0+	6	0+	8	0+	22	0+	13	0.5	58
Filter No. 10.....	0+	7	0+	11	0+	350	0+	340	0+	200	0+	110	1	120
Filter No. 11.....	0+	24	0.5	16	0+	11	0+	9	0+	20	0+	17	0+	35
Filter No. 12.....	0+	11	0+	9	0+	8	0+	18	0+	75	0+	160	1	270
Filter No. 13.....	0+	16	0+	15	0+	32	0+	96	0+	120	0+	54	1	210
Filter No. 14.....	.....	.....	0+	260	0.5	410	0+	190	0+	46	0+	38	1	70
Filter No. 15.....	.....	.....	0.5	94	0.5	50	0+	16	0+	19	0+	24	1	56
Filter No. 16.....	0+	10	0+	13	0+	92	0+	84	0+	64	0+	58	1	150
Filter No. 17.....	0+	11	0+	9	0+	9	0+	13	0+	81	0+	180	1	290
Filter No. 18.....	0+	13	0+	20	0+	16	0+	13	0+	19	0+	34	1	360
Average of all filters.....	0+	20	0+	32	0+	61	0+	64	0+	58	0+	77	1	193
Filtered water basin.....	0.5	19	0.5	17	0+	38	0+	57	0+	55	0+	78	1	200

Belmont Filters—Continued.

	WEEK ENDING.						AVERAGE FOR THE YEAR.	
	DEC. 16.		DEC. 23.		DEC. 30.		Turb.	Bact.
	Turb.	Bact.	Turb.	Bact.	Turb.	Bact.		
Applied water.....	21	21,000	17	36,000	52	86,000	9	9,300
Filter No. 1.....	0+	75	0+	120	2	200	0.5	110
Filter No. 2.....	0.5	54	0+	34	1	93	0.5	60
Filter No. 3.....	0.5	91	0+	39	1	97	0.5	74
Filter No. 4.....	1	130	0+	43	1	80	0.5	78
Filter No. 5.....	0.5	93	0+	34	0.5	52	0.5	59
Filter No. 6.....	0.5	63	0+	96	2	510	0.5	81
Filter No. 7.....	0+	38	0+	41	2	310	0.5	68
Filter No. 8.....	0.5	200	0+	79	2	150	0.5	44
Filter No. 9.....	0.5	88	0+	130	2	130	0.5	41
Filter No. 10.....	0.5	52	0+	21	0.5	38	0.5	74
Filter No. 11.....	0.5	200	0+	130	2	100	0.5	70
Filter No. 12.....	0.5	62	0+	37	0.5	120	0.5	53
Filter No. 13.....	0.5	170	0+	210	0.5	560	0.5	130
Filter No. 14.....	0.5	35	0+	26	2	290	0.5	100
Filter No. 15.....	0.5	61	0+	97	2	210	0.5	78
Filter No. 16.....	0.5	130	0+	170	3	500	0.5	90
Filter No. 17.....	0.5	70	0+	32	0.5	78	0.5	92
Filter No. 18.....	0.5	130	0+	29	2	59	0.5	63
Average of all filters.....	0.5	91	0+	76	1	255	0.5	75
Filtered water basin.....	0.5	90	0+	76	2	190	0.5	88

The following is a statement of the work carried on during the year under the various contracts which have been entered into in connection with the improvement of the water supply. The contracts reported upon are those which constitute the more important features of the work. Minor contracts, such as for resanding of the filters and for the purchase of tools and materials, are not given in detail. General information on all contracts is embodied in the List of contracts which is made a part of this Report, Appendix "A."

TORRESDALE SYSTEM.

CONTRACT No. 25.—TORRESDALE FILTERS AND CLEAR WATER BASIN.

D. J. McNICHOE, Contractor.

The work embraced under this Contract is described in the Report of the Bureau of Water for 1901, page 271.

The work was substantially completed during 1904, the items which remained being such as the completion of the granolithic pavement, adjustment of the regulating apparatus, seeding, sodding and grading.

By order of his Honor, the Mayor, work was suspended June 16.

The financial statement with reference to this Contract is as follows:

Limit of Contract	\$5,000,000.00
Face of estimates	4,884,192.91
Amount paid	4,842,354.33

CONTRACT No. 39-T.—PRELIMINARY FILTERS FOR TOR-
RESDALE.

DANIEL J. McNICHOI, Contractor.

This contract embraces filters intended to remove the heavier suspended matter from the water before it is passed on to the final filters. It consists of 120 rectangular tanks, constructed of reinforced concrete, with all the necessary supply and effluent and discharge piping. The system as planned contemplates the passing of the water through coarse sand at a rate of about 80,000,000 gallons per acre per day. The process of wasing the sand is by a reverse current of wash water, and at certain periods removal of the sand by the ejector process, and passing it through washers similar to those now used in the courts of the final filters.

About one per cent. of the work was completed during 1904, and as soon as the weather permitted, March 2, 1905, work was resumed with considerable progress until June 16, when by order of his Honor, the Mayor, operations were suspended.

The major portion of the work thus far constructed, consisted in the building of an embankment upon which the filters are to be built, and care was taken to insure compactness.

A great deal of material entering into the work has been delivered on the ground, and the larger portion of the 11-foot effluent conduit, which is made of steel riveted pipe, surrounded by concrete, is in place, with the exception of the concrete.

The financial statement with reference to this contract is as follows:

Limit of contract	\$1,354,000.00
Face of estimates	112,989.80
Amount paid	101,690.82

CONTRACT NO. 50.—FILTERING MATERIALS AND COLLECTORS FOR THE TORRESDALE FILTERS.

DANIEL J. McNICHOL, Contractor.

This contract embraces the perforated lateral collectors, gravel underdrains, and filtering sand for fifty-five filters at Torresdale. The Contract was annulled by his Honor, the Mayor, on June 20, at which time the filtering material and collectors were completed in twelve filters, and a number of other filters had received the collectors and underdrain materials.

The financial statement relative to this contract is as follows:

Limit of contract	\$700,000.00
Face of estimates	251,150.00
Amount paid	213,477.50

On September 6, bids were received for the completion of this contract, but no award has been made.

CONTRACT NO. 54.—QUEEN LANE CONTINGENT OF FILTERS AT TORRESDALE.

DANIEL J. McNICHOL, Contractor.

This contract embraces the construction of ten filters adjoining Court No. 3 of the Torresdale Station. They are similar in design and construction to the other filters, and are intended to augment the supply so as to include the Queen Lane distribution district in the Torresdale system, and contemplate the abandonment of the present Queen Lane Pumping Station and Reservoir.

Work under this contract was resumed March 16, and suspended June 16, by order of his Honor, the Mayor.

The financial statement relative to this contract is as follows:

Limit of contract	\$570,000.00
Face of estimates	501,405.78
Amount paid	481,873.41

CONTRACT NO. 59.—SAND WASHERS AND EJECTOR PIPES.

E. M. NICHOLS, Contractor.

This contract embraces the construction of seventeen sand washers on the courts of the Torresdale filters. The washers are all of the ejector type, similar to those used at Roxborough and Belmont.

The contract was completed, and final payment made November 4, 1905.

The financial statement with reference to this contract is as follows:

Limit of contract	\$37,000.00
Amount paid	32,759.44

CONTRACT NO. 34.—TORRESDALE INTAKE.

DANIEL J. McNICHOI, Contractor.

The work under this contract consists of the construction of a horse shoe conduit, 785 feet long, having internal dimensions of 14 feet wide by 10 feet six inches high. The conduit extends into the Delaware River seventy feet beyond the Port Warden's line, and is intended to connect with the Low Service Pumping Station. At the river end a screen chamber and house will be constructed.

During the year 1904, about twelve per cent. of the work was completed. On the 20th of March, 1905, work was resumed. The first concrete was placed April 3.

Water jet borings taken during the winter, 1904-05, indicated that the foundation for several hundred feet was unsuitable and it was necessary to excavate to gravel bottom, which at some points was ten feet below sub-grade. This additional excavation endangered the coffer-dam, which had not been constructed with this in view, and in order to prevent its collapsing it was necessary to drive a second row of sheet piles outside the first line of piles for a distance of about eleven feet.

The work was well under progress up to June 16, when it was suspended by order of his Honor, the Mayor.

The water was kept out of the coffer-dam by pumping until November 25, when the pumps were shut down, and the entire work was allowed to become submerged.

At the time of suspension of the work, 188 feet of the arch had been constructed and 307 feet of the bottom in place.

The financial statement with reference to this contract is as follows:

Limit of contract	\$180,000.00
Face of estimates	51,773.30
Amount paid	46,595.97

CONTRACT No. 81.—PUMPING OUT THE TORRESDALE
CONDUIT.

D'OLIER ENGINEERING COMPANY, Contractors.

Upon the recommendation of the Board of Investigating Engineers and instructions from the Director of the Department of Public Works, this contract was entered into for the purpose of emptying the Torresdale Conduit, so that investigations could be made by the Board of Engineers as to the construction of this part of the work.

The Contractors have erected a plant consisting of two 100-H. P. boilers and two 90-H. P. steam engines. These

engines operate two electrical generators supplying current to two 50-H. P. motors. These motors are attached to two DeLaval pumps, which have a combined capacity of 3,000,000 gallons per day. The pumps are mounted on a movable platform erected in Shaft No. 1, and are capable of being lowered or raised as occasion demands by means of winches which are located at the top of the shaft.

At Shaft No. 11 there has been installed an elevator having a capacity of 4,000 pounds, which is operated by an electrical motor.

The pumps were started on November 20, and the tunnel was empty by December 23, since which time the investigation has been in progress.

The financial statement with reference to this contract is as follows:

Limit of contract	\$30,000.00
Face of estimates	
Amount paid	

CONTRACT NO. 29.—LARDNER'S POINT PUMPING STATION NO. 2.

GEORGE C. DETRICH, Contractor.

This contract consists of the construction of Lardner's Point Pumping Station No. 2 and the connecting conduits to the river and Shaft No. 11 of the Torresdale Conduit, and was described in the Annual Report for the year 1903, page 137.

In order not to interfere with the installation of the pumping machinery, certain items of the work, such as the granolithic pavement outside of the house and the maple flooring in the engine room, were temporarily omitted. With the exception of these items the entire work under this contract was practically completed during 1904.

The financial statement with reference to this contract is as follows:

Limit of contract	\$556,026.30
Face of estimates	555,226.30
Amount paid	555,226.30

CONTRACT NO. 68.—LARDNER'S POINT PUMPING STATION NO. 3.

RYAN AND KELLY, Contractors.

This contract is known as Lardner's Point Pumping Station No. 3, and consists of an engine house, boiler house, pump well, and two brick chimneys; also the foundations for six pumping engines and twenty-four boilers. The building and dimensions are practically a duplicate of the No. 2 Station, built under Contract No. 29.

The entire work with the exception of some minor details is completed ready for the reception of the machinery and boilers.

The financial statement with reference to this contract is as follows:

Limit of contract	\$350,000.00
Face of estimates	245,362.24
Amount paid	208,557.90

CONTRACT NO. 11.—PUMPING MACHINERY FOR LARDNER'S POINT PUMPING STATION NO. 2.

THE HOLLY MANUFACTURING Co., Contractors.

This contract embraces the first three 20,000,000 high-duty, high-service, triple-expansion pumping engines, and the complement of twelve 200 H. P. marine fire box boilers and electric traveling crane.

The erection of the machinery was practically completed in 1904, and with the exception of painting, the work under this contract is entirely completed.

The engines have been running a year, and the duty, capacity and endurance tests have been made in accordance with the contract requirements. The duty tests were made during October under the supervision of Professor H. W. Spangler, representing the City, and Mr. C. H. Anderson, representing the Contractor. Their Report is attached hereto, under Appendix "B."

The financial statement with reference to this contract is as follows:

Limit of contract	\$360,000.00
Face of estimates	320,184.10
Amount paid	272,681.48

CONTRACT NO. 67.—PUMPING MACHINERY FOR LARDNER'S POINT PUMPING STATION NO. 2.

THE HOLLY MANUFACTURING Co., Contractors.

This contract embraces the second set of three 20,000,000 gallon high-duty, high-service, triple-expansion pumping engines, and complement of twelve 200 H. P. marine fire box boilers. The engines are a duplicate of those furnished under Contract No. 11, which are of similar design.

The financial statement with reference to this contract is as follows:

Limit of contract	\$440,000.00
Face of estimates	157,107.60
Amount paid	133,541.46

CONTRACT NO. 48.—ELECTRIC TRAVELING CRANE FOR
LARDNER'S POINT PUMPING STATION NO. 3.

ALFRED BOX & COMPANY, Contractors.

This contract embraces an electric traveling crane of thirty tons capacity for the engine room of Lardner's Point Pumping Station No. 3. The crane has been erected, complete, ready for test. The test has been delayed on account of the inability to secure a sufficient lead; but arrangements have been made through the Contractor with the Pennsylvania Railroad Company to secure a sufficient number of rails, which will be transported to the Station and it is expected that the test will be made before many days.

The financial statement with reference to this contract is as follows:

Limit of contract	6,500.00
Face of estimates	
Amount paid	

CONTRACT NO. 45.—ELECTRICAL GENERATOR, DRIVING
ENGINES AND MAIN SWITCHBOARD FOR LARD-
NER'S POINT PUMPING STATION NO. 3.

J. F. BUCHANAN & Co., Contractors.

A description of this contract is given in the Report of the Bureau for 1904, page 162. At the time of that Report it was stated that "there were some features of the generator not quite in harmony with the requirements of the Specification, and as a precaution against introducing machinery which might not be in all respects satisfactory, the Contractor was ordered to construct, erect and subject to tests, one engine and generator before setting up the remaining two, for the purpose of determining compliance with the essential requirements of the contract."

During the year tests of the engine and generator were made, and in all essential features the condition of this contract remains the same as when the Report quoted was made.

The engine and generator installed has been in use during the year in furnishing light for the pumping station, but does not furnish current for the electric traveling crane.

The financial statement with reference to this contract is as follows:

Limit of contract	\$9,000.00
Face of estimates	
Amount paid	

**CONTRACT NO. 31.—COAL HANDLING MACHINERY AND
POCKETS FOR LARDNER'S POINT PUMPING
STATIONS NOS. 2 AND 3.**

HENDERSON & Co., LTD., Contractors.

This contract embraces a coal pocket of 5,000 tons capacity constructed of steel and lined with timber; coal handling machinery, wharf, electric hoist, cable way leading from the wharf to the pockets, and all necessary equipment to handle coal at the rate of sixty tons per hour from barges moored at the wharf or from the Pennsylvania Railroad tracks.

The contract was awarded March 30, and was suspended July 22, by order of the Director of the Department of Public Works.

Nothing was done on the actual construction of the work.

The financial statement with reference to this contract is as follows:

Limit of contract	\$115,000.00
Face of estimates	
Amount paid	

CONTRACT NO. 28.—LARDNER'S POINT PIPE DISTRIBUTION SYSTEM.

DANIEL J. McNICHOL, Contractor.

This contract is described in Annual Report of the Bureau for 1903, page 145.

The work on this contract was suspended by order of his Honor, the Mayor, on June 16. Suspension of the work at that time left Tacony street, between Wakeling and Orthodox streets, and between Duncan and Ruan streets, closed to travel on account of trench which had been excavated for the reception of pipe. Many complaints having been received from the citizens in this locality on account of inconvenience caused by the streets being closed, work was again ordered forward on September 23, limiting the same to back-filling the open trench within the limits above described and repaving the streets where the trench has been back-filled prior to suspension.

Between Tucker and Ruan streets, approximately 3,500 lineal feet of three 60-inch mains were laid and tested. All the piping and the setting of the valves in Chambers Nos. 8, 9 and 10 was completed, and a part of the concrete work in connection with this Chamber was under way at the time of suspension. Concrete was placed under the 60-inch main on Tacony street, between Duncan and Ruan streets, a distance of 2,870 feet, and in the roof of the Wakeling street sewer.

The fund which has been appropriated for the Lardner's Point Pipe Distribution System is not sufficient to cover the cost of all the pipe required to deliver water into the central districts of the City, and additional money will have to be provided for the completion of this work.

The financial statement with reference to this contract is as follows:

Limit of contract	\$1,700,000.00
Face of estimates	1,444,465.03
Amount paid	1,351,446.15

CONTRACT NO. 27.— OAK LANE RESERVOIR...

R. A. MALONE & Co., Contractors.

The work embraced under this contract was described in the Report of the Bureau for 1901. Work upon this contract so far as construction features are concerned was finished during the year 1904. All that remained were the tests for water-tightness which were made during the year. Considerable delay was experienced in making these tests by reason of the difficulty in getting the water into the Reservoir on account of the inadequate piping which connects the Reservoir to the water distribution system.

The financial statement with reference to this contract is as follows:

Limit of contract	\$560,000.00
Face of estimates	557,799.33
Amount paid	504,799.33

CONTRACT NO. 39-B.—PRELIMINARY FILTERS FOR THE BELMONT STATION.

DANIEL J. MCNICHOL, Contractor.

This contract embraces a system of preliminary filters of 40,000,000 gallons daily capacity, of the same type and in all essentials identical with the preliminary filters at Torresdale.

Construction work was suspended during the Winter months and operations were resumed on April 4, and carried on continuously until June 16, when suspension was ordered by his Honor, the Mayor.

Nearly all the concrete filter floors and a portion of the walls have been constructed. The major portion of the structural material, and cast iron pipes and specials have been delivered at the site of the work.

The financial statement with reference to this contract is as follows:

Limit of contract	\$226,000.00
Face of estimates	45,411.34
Amount paid	40,870.21

CONTRACT NO. 40-B.—SAND WASHER PUMPS AND BOILERS FOR THE BELMONT STATION.

I. P. MORRIS COMPANY, Contractors.

This contract is described in the Report for 1902. The first sand washer pumps furnished as a part of the contract were in all respects unsatisfactory, and the contractor replaced them with new pumps which were put in service and tested this year. Each pump is guaranteed to discharge 1,250,000 gallons of water per day of 24 hours against a total head of 225 feet. The following are the results of the test made December 18, 1905:

Length of test	8 hours
Average steam pressure	123.24 pounds
Average head	222.9 feet
Average piston speed	84.95 feet
Total water pumped to filter (8 hours)	449,032 gallons
Guarantee in eight hours	416,666 gallons
Excess over guarantee	32,366 gallons

The financial statement with reference to this contract is as follows:

Limit of contract	\$29,000.00
Face of estimates	19,462.50
Amount paid	16,543.12

*Electric Lighting System—Roxborough and Belmont.***CONTRACT NO. 44.—ELECTRIC LIGHTING SYSTEM FOR
THE UPPER AND LOWER ROXBOROUGH FILTERS.****PENNSYLVANIA EQUIPMENT COMPANY, Contractors.**

The electrical machinery and wiring embraced under this contract was substantially completed in 1902. The tests to prove the efficiency guarantee were made in 1904, but final payment was not made until this year on account of some adjustments which were necessary relating to some of the items which were a part of the contract requirements.

The financial statement with reference to this contract is as follows:

Limit of Contract	\$15,500.00
Face of estimates	15,360.48
Amount paid	15,360.48

**CONTRACT NO. 46.—ELECTRIC LIGHTING EQUIPMENT
FOR THE BELMONT FILTERS.****PENNSYLVANIA EQUIPMENT COMPANY, Contractors.**

This contract embraces two sets of driving engines, and electrical generators, and the wiring of the filters. The machinery was put into service and tested during 1904. There are, however, some small items which remain to be adjusted before final payment can be made.

The financial statement with reference to this contract is as follows:

Limit of contract	\$20,000.00
Face of estimates	18,717.47
Amount paid	15,909.85

Belmont Laboratory.

The work of the chemists and bacteriologists was carried on without interruption notwithstanding the Laboratory was moved from Spring Garden Testing Station to the Administration Building of the Belmont Filters. All furnishings and equipment in the old laboratory which could be utilized were gradually transferred to Belmont.

The routine work was carried on as in former years, which consists of the examination of the Schuylkill and Delaware river waters; the water as applied to the filters and the effluent of the filters, and the examination of samples collected at various stations in West Philadelphia. These latter examinations are made to determine whether there is any deterioration of the water after leaving the filter station before it is received by the consumers, and it is gratifying to note that there is no evidence of any deterioration on account of the water passing through the pipe distribution system.

Tests are made of the river water and filter effluents to determine the presence of the *Bacillus Coli Communis*.

Considerable time was devoted to special investigations. During the Fall analyses were made of water collected from the Delaware river at or near Point Pleasant and from Tohickon creek near its mouth.

Samples of Delaware river water were collected at various points above Lardner's Point Pumping Station, and within the City limits, to determine the extent of pollution from the City sewers.

Analyses were also made of filter sand and gravel, and other miscellaneous work was carried on during the year.

Summary of the work of the laboratory is as follows:

Number of chemical analyses made.....	15,000
Number of bacteriological analyses made	28,800
Number of examinations for <i>B. Coli Communis</i> ,	
1. c. c.....	1,125
Number of examinations for <i>B. Coli Communis</i> ,	
50 c. c.....	450

Experimental Investigation—Preliminary Filter No. 12.

Work at the Spring Garden Testing Station has been confined to the operation of Pre-filter No. 12, which is constructed on the same plan as the preliminary filters now under construction at Belmont and Torresdale.

This filter was operated throughout the year under varying conditions as to size and depth of sand bed, but the rate of filtration was maintained at the rate of 80,000,000 gallons per acre per day.

In April a Root blower was installed and air was used to agitate the sand in the process of washing. In May pre-filtered water was used in washing the sand instead of river water as had been the former custom.

Prior to August the sand used in this filter had an effective size of 0.51 mm. and a uniformity coefficient of 1.73, which clogged readily and required frequent washing. Economy in the quantity of wash water used being an important factor in the operation of the preliminary filters, it was largely to determine this quantity that the investigations were carried on, and while the fine sand was entirely satisfactory as to the amount of suspended matter removed, it was thought that to some extent efficiency could be sacrificed with a view to reducing the quantity of wash water used. Therefore in August the fine sand was removed and sand having an effective size of 0.97 mm. and a uniformity coefficient of 1.39 was placed in the filter. The effect of this change was a great saving in the amount of wash water required, and less than 1 per cent. of the total amount of water filtered has been used for this purpose.

While the efficiency with the coarser sand is not quite so high it is nevertheless satisfactory, and compares favorably with the efficiency of the Lower Roxborough Preliminary Filters. It is possible, however, that sand between the

sizes used in the experiments thus far would give better results in all respects, and preparations are now being made to operate the filter with a finer sand.

The experiments indicate that by using air the washing of the said in the filter is more effective than when water only is used.

On March 27, a fire of unknown origin destroyed the office and laboratory and other parts of the building. The old building was roughly repaired and a new office constructed. The operation of the filter was interrupted only a few hours.

INFLUENCE OF FILTERED WATER ON TYPHOID FEVER CASE RATES.

Following the custom of last year a compilation of statistics from the Bureau of Health has been made with a view to showing the effect of filtered water upon the typhoid fever case rates in the various sections of the City.

Comparing Wards 21 and 22, which receive water from the Roxborough Filters, with the remainder of the City, the reduction in the typhoid fever case rates was 59.7 per cent. Attention is called to the fact that many of the people living in this district are occupied during the day in other portions of the City receiving unfiltered water, and that many of the inhabitants use well water.

During August and again in the latter part of September the reports show a considerable increase in typhoid fever in these wards. Special investigations of the cases were made by the Bureau, and so far as possible the history of the origin of each case was obtained, special attention being given to the source of water consumed by the patient prior to affection. In nearly every instance it was found

that the disease was contracted outside the City or that well water was used for drinking purposes, or that the patient's occupation was in other districts of the City which are being supplied with unfiltered water.

It is gratifying to note that there were but fifteen cases of typhoid fever in the filtered water district of West Philadelphia as compared with 54 cases in the mixed water district, or a reduction of 90.9 per cent. This was less than one case per 100,000 of population in the filtered water district as against nearly eight per 100,000 of population in the mixed water district.

The table submitted herewith shows the percentage reduction in the typhoid fever case rates in Wards 21 and 22, receiving water from the Roxborough Filters, as compared with four other districts, viz., Wards 28 and 38, receiving water pumped at Queen Lane Pumping Station; West Philadelphia as a whole; Wards 23, 25, 33 and 35, which receive Delaware River water pumped at Lardner's Point Pumping Station, and the filtered water district of West Philadelphia.

Respectfully submitted,

GEO. S. WEBSTER,
Acting Chief Engineer.

APPENDIX "A"

**TABLE SHOWING CONTRACTS MADE TO DATE
WITH AMOUNTS PAID THEREON.**

List of Contracts for the Improvement, Extension and Filtration of the Water Supply.

15

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment
1 1 Sup.	A Testing Station..... Extension to Testing Station	Thos. Parker..... Thos. Parker.....	Feb. 27, 1900..	March 6, 1900.. May 7, 1900...	\$9,000 00 5,000 00	} \$11,653 54	July 13, 1900.
2	Ice Refrigerating Machine...	Newburg Ice Machine & Engine Co.	July 20, 1900..	Aug. 20, 1900..	800 00	800 00	Nov. 19, 1900.
3	Filtering Sand and Gravel for Testing Station.....	Norcross & Edmunds.....	July 20, 1900..	Sept. 4, 1900..	2,500 00	1,016 54	Nov. 2, 1900.
4	Platinum Ware for Testing Station.....	Chas. Lentz & Sons.	July 20, 1900..	July 27, 1900..	674 50	674 50	Oct. 31, 1900.
5	Testing Borings.....	F. aghouse & Beeson	Aug. 7, 1900..	Sept. 6, 1900..	9,750 00	8,333 50	March 9, 1901.
6	Platinum Ware for Testing Station.....	Arthur H. Thomas Co.....	Dec. 12, 1900..	.....	444 95	444 95	February 6, 1901.
7	Lower Roxborough Filters.....	.....	Dec. 12, 1900..	No Award made.	Ready	ertized as C	ontract No 10.
8	Sand Ejector.....	Patrick Gormly	April 17, 1901.	May 6, 1901...	1,800 00	1,712 03	August 7, 1901.

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List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
9	Cast Iron Water Pipe, Special Castings, Stop Valves, Pipe Laying, etc	Bids rejected on Pipe Lines 9A to "J" inclusive. See Contracts "9A," "9B" and "9C" for rest of Contract.					
9A	Cast Iron Stop Boxes	J. Alfred Clark	Feb. 11, 1901..	May 14, 1901..	\$2,100 00	\$1,538 80	Dec. 21, 1901.
9B	Stop Valves	Eddy Valve Co.....	Feb. 11, 1901..	May 8, 1901..	17,000 00	14,408 06	Dec. 21, 1901.
9C	Cast Iron Water Pipe and Special Castings for Lower Roxborough Filters	D. J. McNichol.....	Feb. 11, 1901..	May 8, 1901..	7,500 00	7,488 14	Dec. 20, 1901.
10	Lower Roxborough Filters..	D. J. McNichol.....	Feb. 11, 1901..	Mar. 20, 1901..	250,000 00	290,929 70	March 1, 1902.
11	Pumping Engines and Boilers and Electric Travelling Crane for Lardner's Point Pumping Station	Holly Mfg. Co.....	May 1, 1901..	June 6, 1901..	860,000 00	272,681 48	Not completed.
12	Upper Roxborough Filters..	D. J. McNichol.....	April 17, 1901.	May 8, 1901..	540,000 00	550,911 59	Nov. 11, 1903.
13	Rotary Stop Valves, Patterns and Core Boxes	Eddy Valve Co.....	April 17, 1901.	June 1, 1901..	13,000 00	12,825 00	Nov. 22, 1902.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply--Cont'd.

No.	Description of Contract	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
14	Torresdale Filters	D. J. McNichol.....	May 28, 1901..	Oct. 4, 1901....	\$1,350,000 00	\$1,364,646 26	April 10, 1905.
15	A Test Pit at Lardner's Point	Contract abandoned.	Work done	by Water Bureau.			
16	Belmont Sedimentation Reservoir, Filters and Clear Water Basin	Ryan & Kelley.....	May 28, 1901..	Aug. 7, 1901...	2,000,000 00	1,969,136 18	October 10, 1904.
17	Extension of Distribution System.....	D. J. McNichol.....	April 17, 1901.	June 4, 1901..	750,000 00	749,455 01	October 24, 1902.
18	Low Service Pumping Machinery for Upper Roxborough Filters	Henry R. Worthington, Inc.....	July 20, 1901..	Aug. 22, 1901..	23,500 00	21,332 09	March 29, 1904.
19	Belmont Rising Mains, Upper Roxborough Connection Pipes and Extension of Distribution System.....	D. J. McNichol.....	Dec. 18, 1901..	Jan. 30, 1902..	500,000 00	499,805 18	Feb. 7, 1903.
20	Triplex Pumps and Gasoline Driving Engines for Upper Roxborough Filters.....	Fairbanks, Morse & Co.....	Dec. 18, 1901..	Mar. 1, 1902...	10,800 00	10,490 00	Jan. 25, 1904.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
21	Low Service Pumping Station for Upper Roxborough Filters	Henderson & Co., Ltd.	Sept. 25, 1901.	Oct. 21, 1901..	\$21,000 00	\$18,725 43	Not completed.
22	Hand Travelling Crane for Low Service Pumping Station, Upper Roxborough Filters	Alfred Box Co.....	July 29, 1901..	Dec. 19, 1901..	2,900 00	2,800 00	August 14, 1902.
23A	Administration Building and Pumping Station, Upper Roxborough Filters	D. J. McNichol.....	June 25, 1902..	Aug. 6, 1902..	43,000 00	38,440 60	August 19, 1903,
24	Filtering Materials and Collector for Upper and Lower Roxborough Filters and Sand Washers for Lower Roxborough Filters.....	D. J. McNichol.....	Dec. 18, 1901..	Jan. 30, 1902..	200,000 00	250,358 53	August 24, 1903.
25	Torresdale Filters and Clear Water Basin	D. J. McNichol.....	Dec. 18, 1901..	Jan 18, 1902..	5,000,000 00	4,842,354 33	Not completed.
26	Torresdale Testing Station ..	Patrick Gormly....	July 29, 1901..	Aug. 20, 1901..	9,000 00	8,643 00	Dec. 19, 1901.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
27	Oak Lane Reservoir.....	R. A. Malone & Co..	Dec. 18, 1901.	Mar. 14, 1 02.	\$550,000 00	\$504,799 33	Not completed
28	Lardner's Point Distribution	D. J. McNichol.....	Feb. 6, 1903.	Mar. 4, 1 03.	1,700,000 00	1,381,446 15	Not completed.
29	Lardner's Point Pumping Station No. 2	Geo. C. Deitrich.....	Sept. 17, 1902.	Oct. 4, 1902.	565,000 00	555,226 30	Not completed.
30	Lardner's Point Pumping Station No. 2 .....	.....	Feb. 26, 1902.	Readvertised as contract No. 29.			
31	Coal Handling Machinery and Pockets, Lardner's Point Pumping Stations, Nos 2 and 3.....	Henderson & Co., Ltd.....	Feb. 2, 1905.	April 12, 1905.	115,000 00	.....	No payments made.
32	Addition to Testing Station at Spring Garden Pumping Station.....	.....	Sept. 25, 1901.	No Award made			
33	Sand Washers for Upper Roxborough Filters.....	F. M. Nichols.....	Mar. 24, 1903.	April 4, 1903.	4,000 00	3,849 00	Sept. 4, 1903.
34	Torresdale Intake.....	D. J. McNicho'.....	Aug. 2, 1904.	Aug. 8, 1904.	180,000 00	46,595 97	Not completed.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
37	Preliminary Filters, Lower Roxborough	Maignen Filtration Co.	Sept. 23, 1902.	Oct. 27, 1902..	\$40,800 00	\$40,600 00	Feb. 17, 1905.
37A	Foundation and Superstructure for the Lower Roxborough Preliminary Filters..	D. J. McNichol.....	Feb 16, 1903..	Mar. 4, 1903..	50,000 00	47,076 48	April 8, 1904.
38	Preliminary Filters for Belmont .....	.....	Feb. 18, 1904..	No Award.			
39	Preliminary Filters for Belmont and Torresdale.....	D. J. McNichol.....	Nov. 1, 1904..	Nov. 22, 1904..	1,580,000 00	142,561 08	Not completed.
40A	Low Service Drainage for the Belmont Filters.....	Camden Iron Wks.	June 30, 1903.	July 27, 1903..	7,000 00	7,208 44	Dec. 30, 1904.
40B	Sand Washers, Pumps and rollers for Belmont Filters	I. P. Morris Co.....	June 30, 1903.	July 24, 1903..	20,000 00	16,543 12	Not completed.
42	Administration Building and Pumping Station at Belmont Filters	H. B. Shoemaker & Co.	June 30, 1903.	July 17, 1903..	55,000 00	51,488 36	Sept 24, 1904.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
44	Electric Lighting System for the Upper and Lower Roxborough Filters.....	Penna. Equipment Co.....	Mar. 24, 1903.	April 22, 1903.	\$15,500 00	\$15,860 48	Nov. 27, 1905.
45	Electrical Generators, Driving Engines, etc. for Lardner's Point Pumping Station, No. 2.....	J. F. Buchanan & Co	Feb. 18, 1904..	Aug. 5, 1904..	9,000 00	.....	No payments made.
46	Electric Lighting System for the Belmont Filters.....	Penna. Equipment Co.....	June 30, 1903..	July 21, 1903..	20,000 00	15,909 85	Not completed.
48	Electric Travelling Crane for Lardner's Point Pumping Station No. 3.....	} Alfred Box Co... {	Aug. 2, 1904... Nov. 1, 1904...	No Award. Nov. 17, 1904..	6,500 00	.....	No payments made.
49	Filtering Materials and Underdrains for the Belmont Filters.....	D. J. McNichol.....	Feb. 16, 1903..	Mar. 4, 1903...	365,000 00	340,736 91	Sept. 28, 1904.
50	Filtering Materials and Underdrains for the Torre-dale Filters.....	D. J. McNichol.....	Feb. 16, 1903..	Mar. 4, 1903...	500,000 00	213,477 50	{ Cont. Annulled June 20, 1905.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
51	Filtering Materials and Underdrains for the Torresdale Filters .....	.....	Sept 6, 1905.				
54	Queen Lane Contingent—Torresdale Filters.....	D. J. McNichol.....	Feb. 18, 1904..	July 28, 1904..	\$570,000 00	\$481,873 41	Not completed.
59	Sand Washers and Ejector Pipes for Torresdale Filters	E. M. Nichols.....	Aug. 11, 1904..	Sept. 8, 1904..	37,000 00	32,759 44	Nov. 4, 1905.
62	Baffles for the Lower Roxborough Reservoir.....	.....	June 25, 1902..	No Award	made.		
63	Sand Washers for the Belmont Filters.....	Patrick Gormley...	June 30, 1903..	July 16, 1903..	6, 00 00	6,595 00	Dec. 8, 1903.
65	Hand Traveling Crane for the Low Service Pumping Station, Belmont Filters...	Alfred Box Co.....	June 30, 1903..	July 16, 1903..	2,700 00	2,700 00	Aug. 4, 1904.
66	Pipe Line "U"—Extension of the Roxborough Distribution System.....	J. H. Louchheim. {	Sept. 4, 1903... Feb. 18, 1901..	No Award Aug. 3, 1904...	made. 110,000 00	100,558 62	January 27, 1905.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
67	Pumping Machinery for Lardner's Point Pumping Station, No. 2.....	Holly Manufacturing Co.....	Feb. 18, 1904..	Aug. 18, 1904.	\$440,000 00	\$183,541 46	Not completed.
68	Lardner's Point Pumping Station, No. 3.....	Ryan & Kelley....	Feb. 18, 1904..	Aug. 17, 1904..	350,000 00	208,557 90	Not completed.
73	Washers, Boxes and Piping for Foundation Bolts of Engines at Lardner's Point Pumping Station, No. 8....	J. Alfred Clarke	Aug. 15, 1904..	Aug. 29, 1904..	2,050 00	2,048 25	Nov. 17, 1904.
74	Removal of Laboratories from Spring Garden Testing Station to Belmont Filters.....		Aug. 15, 1904.. Sept. 6, 1904..	No Award.	Work done	by Water Bureau.	
75	Furnishing Electric Ducts for Torresdale Filters.....	Standard Vitrified Conduit Co.....	Aug. 15, 1904..	Sept. 2, 1904..	1,000 00	924 75	Oct. 10, 1904.
76	Furnishing and Placing Ventilator Screens for Torresdale Filters.....	De Witt Wire Cloth Co.....	Aug. 15, 1904..	Aug. 30, 1904..	7,750 00	7,619 96	Dec. 22, 1904.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
77	Grading and Sodding Walks around Lardner's Point Station, No. 2		June 19, 1905..	No Award.			
78	Restoring Sand at the Belmont Filters.....	Williamson & McLaughlin.....	June 19, 1905 ..	July 28, 1905..	\$2,00 00	\$2,300 00	Oct. 25, 1905.
79	Flooring Lardner's Point Pumping Station, No. 2....		June 19, 1905..	No Award.			
80	Restoring Sand to Filters of the Belmont, Upper and Lower Roxborough Stations	Wm. McKeon.....	Oct 3, 1905....	Oct. 14, 1905 ..	2,500 00	2,484 89	Dec. 29, 1905.
81	Pumping out Tor: esdale Conduit.....	D'Olier Engine Co..	Oct. 3, 1905....	Oct. 16, 1905..	30,000 00	.....	No payments made.
82	Ten (10) Boilers of the Belmont Pumping Station....	Coatsville Boiler Works.....	Nov. 3, 1905 ..	Nov. 17, 1905 .	42,000 00	.....	No payments made.

List of Contracts for the Improvement, Extension and Filtration of the Water Supply—Cont'd.

No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Final Payment.
84	Electrical Supplies for the Torresdale Conduit.....	The Mayer & Englund Co.....	Nov. 8, 1905..	Nov. 17, 1905..	\$4,500 00	.....	No payments made.
85	An Electro-Pneumatic Drill	Ingersoll-Rand Co..	Nov. 8, 1905..	Nov. 20, 1905..	1,410 00	.....	No payments made.

APPENDIX "B"

REPORT OF EXPERTS ON TESTS OF PUMPING
MACHINERY.

UNIVERSITY OF PENNSYLVANIA,

Philadelphia, Nov. 24, 1905.

MR. A. LINCOLN ACKER.,
Director, Department of Public Works, Philadelphia.
THE HOLLY MANUFACTURING CO.,
Buffalo, N. Y.

SIRS:—The undersigned Engineers appointed under Section 123 of the “General Specifications for Pumping Engines and Boilers, and Electric Traveling Crane for the Frankford Pumping Service, Lardner’s Point, ‘Contract No. 11’ ” would respectfully make the following report of the tests made to determine whether the guarantee stated in Section 124 of that specification was fulfilled or not:

The tests were made during two periods of 24 hours each, engines Nos. 5 and 6, makers Nos. 534 and 533, having been tested for 24 hours on October 6 and 7 and on October 20 and 21, engines Nos. 5 and 7, makers Nos. 534 and 532, were tested for a period of 24 hours.

As directed in Article 123 all pump valves, charging cocks, drain cocks and relief valves were examined before the engines were tested and were tight. The only leakage around the plungers was that amount intended by the maker to properly lubricate the plungers, the amount of which is stated below and is less than .025 of 1% of the plunger displacement.

Under the terms of Section 123 the capacity of the pumps during the duty test was determined by plunger displacement and no correction has been made for slip as the leakage from plungers and valves was found not to exceed two per cent. (2%).

The specification in Section 124 states explicitly the method of making this test and this method was strictly followed. The duty stated hereafter is based on the total

coal fired under the boilers, with no allowance for ash or other non-combustible, but the coal was reduced to weight of dry coal, and the reduction for moisture is the mean percentage loss of three (3) one hundred (100) pound samples, taken at random from the coal used during the duty trial, placed in weighed wooden boxes, with perforated sides and covers, and allowed to remain twenty-four (24) hours on top of the boilers. No other drawback on account of coal has been allowed and no allowance has been made for moisture in the steam.

The specification further states that the duty shall be stated as one hundred (100) times the product of the total head, the area of the water plungers, and one-half ($\frac{1}{2}$) the total travel of all the plungers, divided by the coal, in pounds, burned during the trial. This method was followed in determining the duty, except, 1st, that the necessary weight factor was used to complete the above statement, and 2nd, that the suction head was determined by a mercury column checked by a float in the river.

The duty obtained on the trial of engines Nos. 5 and 6 was 141,251,564 foot pounds per one hundred (100) pounds of coal and on the trial of Nos. 5 and 7 was 140,910,587 foot pounds per one hundred (100) pounds of coal, an excess over the contract requirement of one hundred and thirty million (130,000,000) of 8.65% in the tests of engines Nos. 5 and 6 and 8.39% in the tests of engines Nos. 5 and 7.

The capacity of these engines, as actually run during the test, from plunger displacement, was as follows:—

Oct. 6 and 7—No. 533	22,193,627 gals.
No. 534	21,912,815 gals.
Oct. 20 and 21—No. 531	21,846,797 gals.
No. 532	21,803,543 gals.

The capacity of each pump reduced to the standard piston speed of 220 feet per minute is 21,113,683 gallons.

In addition to the data called for under the specifications, complete data of the work done by the boilers was obtained, the amount of water passing through the 60-inch main was determined by pitot measurements, and indicator cards were taken from the engine.

On October 27, a test was made of two boilers to determine the maximum capacity of the boilers, and the data and results from all the tests are contained in the following pages.

The engines and boilers worked entirely satisfactorily during all the tests and the requirements of the specification as to capacity and duty on the contract trial as set forth in Sections 123 and 124, have been fully complied with.

Very respectfully,

(Signed) H. W. SPANGLER,

Appointed by the Director of the Department of Public Works.

(Signed) C. H. ANDERSON,

Appointed by the Contractor.

Data and Results.

Engine tested (Contractor's No.)	....	533	534	534	532
Engine tested (Department No.)	....	6	5	5	7
Date of test	.....	Oct. 6 & 7, 1905	Oct. 20 & 21, 1905		
Duration of test	.....	24 hours.		24 hours.	

Capacity.

Average revolutions per minute	21.02	20.76	20.69	20.65
Diameter plunger.....	33"	33"	33"	33"
Number of plungers.....	3	3	3	3
Stroke.....	6"	66"	66"	66"

Displacement per 24 hours	{ ..... ..... ..... .....	.....22,193,627 gals.
		.....21,912,815 gals.
		.....21,846,797 gals.
		.....21,803,543 gals.

Water used to lubricate plunger per 24 hours 4,800 gals. 4,000 gals....4,960 gals.

Work Done.

Head pumped against:				
Pressure	88.3 lbs.	87.2 lbs.	86.6 lbs.	87.01 lbs.
Suction to center of pressure gauge...	22.55 ft.	22.59 ft.	24.14 ft.	23.46 ft.
Total head	225.99 ft.	223.50 ft.	223.67 ft.	223.93 ft.
Work done per hour .....	..... 1,746,047,393 ft. lbs.			
	.....1,704,954,332 ft. lbs.			
	.....1,700,743,682 ft. lbs.			
	.....1,699,428,800 ft. lbs.			
Both Engines	3,451,101,725 ft. lbs.	3,400,172,482 ft. lbs.		

Coal.

Boilers in use	Nos. 9, 10, 11, 12	Nos. 9, 10, 11, 12.
Kind of coal	Henrietta	Semi-Bituminous.
Total coal fed to boilers per hour	2472.08 lbs.	2446.3 lbs.
Moisture in coal	1.17%	1.37%
Dry coal per hour	2443 lbs.	2413 lbs.
Percentage ash in dry coal	6.74%	6.13%
Combustible per hour....	2278.5 lbs.	2265.3 lbs.
Duty	141,251,564 ft. lbs.	140,910,587 ft. lbs.

Pressures.

Boilers	153.1 lbs.	152.8 lbs.
At Engines	149.0 lbs. 145.0 lbs.	144.3 lbs. 145.3 lbs.
First Receiver	24.9 lbs. 26.9 lbs.	27.0 lbs. 24.8 lbs.
Second Receiver	3.7 lbs. 3.8 lbs.	3.8 lbs. 5.6 lbs.
Vacuum.....	25.6" 25.7"	25.7" 26.0"
Barometer.....	30.28"	29.97"
Draft in flue.....	0.439" water	0.402" water
Draft in furnace.....	0.82" water	0.160" water

Temperatures.

Feed Water	125.5° F.	122.1° F.
Air	55.4° F.	50.0° F.
Chimney Flue	601.0° F.	610.6° F.
Water		62.2° F.

Analysis.

Coal—Proximate—Moisture	0.70%	0.82%
Volatile	5.50%	6.53%
Fixed Carbon	88.03%	87.68%
Ash	6.46%	5.79%
Heat per lb. dry coal from proximate analysis	14120 B. T. U.	14300 B. T. U.
Heat per lb. dry coal by calorimeter	14460 B. T. U.	14460 B. T. U.
Chimney Gas—% Vol.		
CO ₂	11.85%	8.85%
O	7.17%	6.83%
CO .....	.22%	.44%
N	80.76%	83.88%
Air per lb. Carbon	18.35 lbs.	19.79 lbs.
Air per lb. Coal	17.47 lbs.	18.89 lbs.
Ash—Carbon per lb. Ash.....	.3285 lbs.	.2888 lbs.
Carbon per lb. Dry Coal.....	.022 lbs.	.018 lbs.
Heat lost in ash per lb. dry coal.	319 B. T. U.	261 B. T. U.
Heat lost in stack gas per lb. dry coal	2420 B. T. U.	2676 B. T. U.
Heat given to steam per lb. dry coal	10377 B. T. U.	10409 B. T. U.
Boiler Efficiency	71.76%	71.98%

Evaporation.

Water evaporated per hour	23026 lbs.	22760 lbs.
Water evaporated per lb. dry coal	9.43	9.43
Quality of steam	dry.	dry.
Water evaporated per lb. combustible..	10.11	10.05
Water evaporated per lb. combustible from and at 212°	11.51	11.48

Boiler Capacity.

Water evaporated per hour from and at 212°	26236 lbs.	26012 lbs.
Total Boiler H. P.	760.5	753.9
H. P. per boiler	190.1	188.5
Equivalent water evaporated from 100° to 160° lbs. per hour ...	22482 lbs.	22282 lbs.
Contract boiler evaporation from 100° F. to 160° lbs.	24000 lbs. per hr.	2400 lbs. per hr.

Diagrams 1 and 2 show the relation between the coal and water supplied, the scale being ten times as great for the water as for the coal. The points marked on the diagram are at arbitrary intervals representing about fifteen barrows of coal and fifteen tanks of water. The water diagram is proportional to the water actually evaporated in the boiler, while the coal account represents the coal as weighed for use, the actual quantity used corresponding with that weighed only at the beginning and end of each test.

Pitot Measurements.

Pitot measurements were taken in one of the 60-inch mains through which all the water discharged by the pumps under test should pass. The results of two separate traverses during each test are plotted on diagrams 3 and 4 herewith. The measured area of the cross-section of the pipe at the point at which the measurements were taken is 19.839 square feet. The plunger displacement for one pump is 98,003 cubic feet per revolution.

During the test, Oct. 6-7, the average velocity through the pipe was 3.364 feet per second and the equivalent average number of revolutions was .6937 per second for one pump.

Quantity per second by displacement	98.003 x .6937	67.986 cu. ft.
Quantity per second by pitot	19.839 x 3.364	66.745 cu. ft.
Difference in % of displacement		1.82%

During the test of Oct. 20-21, the average velocity through the pipe was 3,302 feet per second and the equivalent average number of revolutions was .68472 per second for one pump.

Quantity per second by displacement	98.003 x .68472	67.104 cu. ft.
Quantity per second by pitot	19.839. x 3.302	65.504 cu. ft.
Difference in % of displacement		2.38%

Indicated Power.

Indicator cards were taken from each engine under test for six hours, and sample cards for each engine have been

photographed and are here shown in diagrams 5, 6, 7 and 8. The cards are arranged in position corresponding to the position of the cylinder from which they have been taken. The distribution of power between the different cylinders, as determined from the cards, is shown in the following table:—

Date of tests.....	Oct. 6 and 7		Oct. 20 and 21	
Engine.....	533.....	534	534.....	532
High Pressure Steam	340.3	343.5	339.2	321.5
Intermediate Steam	314.7	291.2	307.0	318.9
Low Pressure Steam	278.2	281.6	275.8	263.1
Total Steam	933.2	916.3	922.0	903.5
Total Water	892.1	887.8	874.3	868.1
Mechanical Efficiency	95.6%	96.8%	94.8%	96.1%
Power from volume and head				
of water	882	861	859	858
Steam per indicated horse power..	12.45 lbs.		12.47 lbs.	
Heat units from steam pressure				
to vacuum temperature used				
per minute per indicated horse				
power	227.2 B. T. U.		227.9 B. T. U.	
Efficiency from heat in steam to				
work in discharge main.....	17.58%		17.51%	
Efficiency from coal fired to boil-				
ers to work in discharge main	12.56%		12.52%	
Coal per indicated horse power per				
hour	1.337 lbs.		1.340 lbs.	

Boiler Test.

Date of trial	Oct. 27, 1905.
Boilers tested	Nos. 9 and 10
Duration of test	10 hours
Object of test	To determine maximum capacity
Kind of coal use ..	Henrietta—A good quality of semi-bituminous

Coal and Ash.

Coal per hour	2203.3 lbs.
Moisture in coal	2.5%
Dry coal per hour	2148.2 lbs.
Ash percentage of dry coal	6.51%
Combustible per hour	2008.4 lbs.

Coal—Proximate analysis:

Moisture	0.72%
Volatile	3.89%
Fix. Carbon	90.30%
Ash	5.81%

Ash—Analysis:

Combustible in 1 lb. ash .....	.4751 lbs.
Combustible in ash per lb. dry coal .....	.0309 lbs.
Heat per lb. dry coal from proximate analysis...	14100 B. T. U.
Heat per lb. dry coal by calorimeter	14325 B. T. U.

Pressures and Temperatures.

Boiler pressure—corrected gauge	148 lbs.
Barometer height	30.23 ins.
Draft in flue	0.828 " water.
Draft in furnace	0.270 " water.
Temperature air	51.0° F.
Temperature feed	94.5° F.
Temperature flue	705.0° F.

Analysis Flue Gas.

CO ₂	7.56% volume
O	9.09%
CO .....	.85%
N	82.50%
Air per lb. carbon	23.52 lbs.
Air per lb. dry coal (approximate)	22.42 lbs.

Water.

Water evaporated per hour	18596.6 lbs.
Quality of steam	dry
Water evaporated from and at 212° per hour.....	21773 lbs.
Equivalent evaporation from 100° to 160 lbs.....	18659 lbs.
Contract requirement for 2 boilers from 100° F. to 160 lbs. gauge pressure	12000 lbs.
Capacity above contract requirements	55.5%

Efficiency.

Water evaporated per pound dry coal	8.66 lbs.
Water evaporated per pound combustible	9.26 lbs.
Water evaporated per pound combustible from and at 212°	10.84 lbs.

Heat per lb. dry coal	14325	B. T. U.
Heat lost in ash	448	B. T. U.
Heat in chimney gas	3681	B. T. U.
Heat given to steam	9793	B. T. U.
Boiler Efficiency	68.36%	

Diagram 9 shows the relation between the coal and water during this test, the statements made relating to diagram 1 and 2 applying also to this one.

Engine Data.

The following general data for each pump supplied by the makers of the pumps is added for reference purposes:

	High	Intermediate	Low
Cylinder diameter.....	32"	60"	90"
Piston rods.....	7½"	7½"	7½"
Clearance Vol. Top.....	0.901 %	1.51 %	0.852 %
Clearance Vol. Bottom.....	0.930 %	1.58 %	0.856 %

	First	Second
Receiver Volume	205 cu. ft.	304 cu. ft.
Receiving Heating Surface	166 sq. ft.	304 sq. ft.

	Diameter	Length
Crosshead Pins.....	12"	11"
Crank pins.....	12"	11"
Shaft bearings.....	17½	32"
Shaft at centre.....	20½	

Distance rods—Four (4) each 5 inches diameter.

Air pump—One (1) 28 inches diameter, 66 inches stroke.

Feed pump—One (1) 3¼ inches diameter, 66 inches stroke.

Feed water heater—One (1) in exhaust, 308 square feet.

Fly wheels—Two (2), 20 feet diameter and weighing 32 tons each (approximate).

Throttle Valve—8 inches diameter.

Exhaust pipe—24¾ inches diameter.

Suction Pipe—Main 42 inches diameter, branch 30 inches diameter.

Discharge Pipe—Main 42 inches diameter, branch 30 inches diameter.

Suction injection—8 inches and 10 inches diameter.

Force injection—3 inches and 3½ inches diameter.

Overflow—18 inches diameter.

Boiler.

Number for each engine—4.

Type—Gunboat—internally fired.

Diameter—9 feet.

Length—20 feet.

Grates—2 to each boiler, 3 feet 6 inches x 5 feet 9 inches, flat herringbone.

Grate surface per boiler, 40.25 square feet.

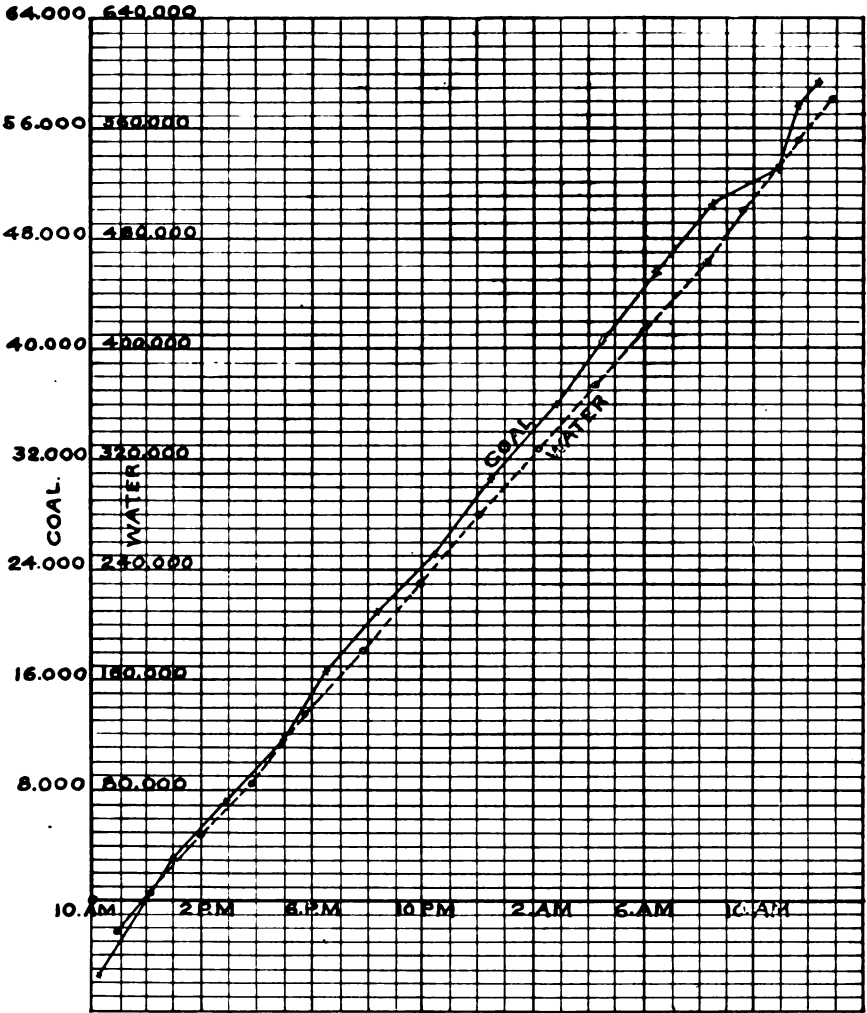
Tubes, No. 195, diameter $3\frac{1}{2}$ inches.

Heating surface per boiler, 1811.5 square feet.

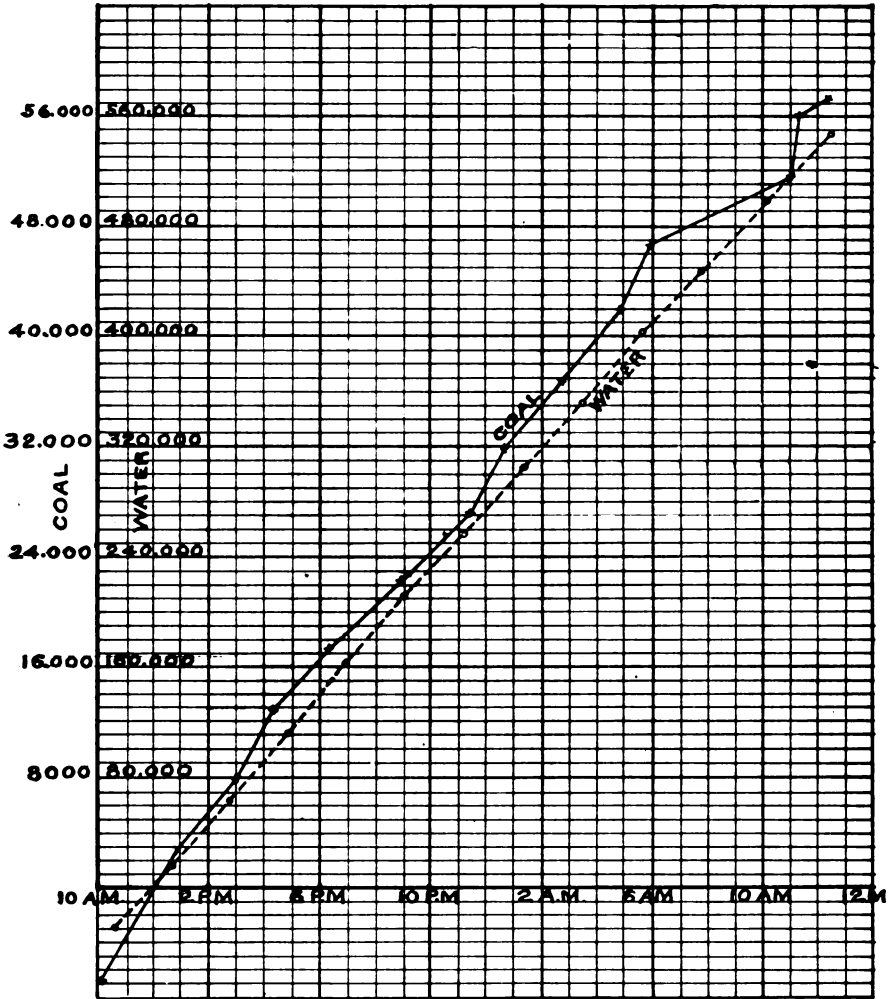
Furnaces, 2 to each boiler, 7 feet $5\frac{1}{4}$ inches long—suspension—41 inches diameter.

(Signed) H. W. SPANGLER.

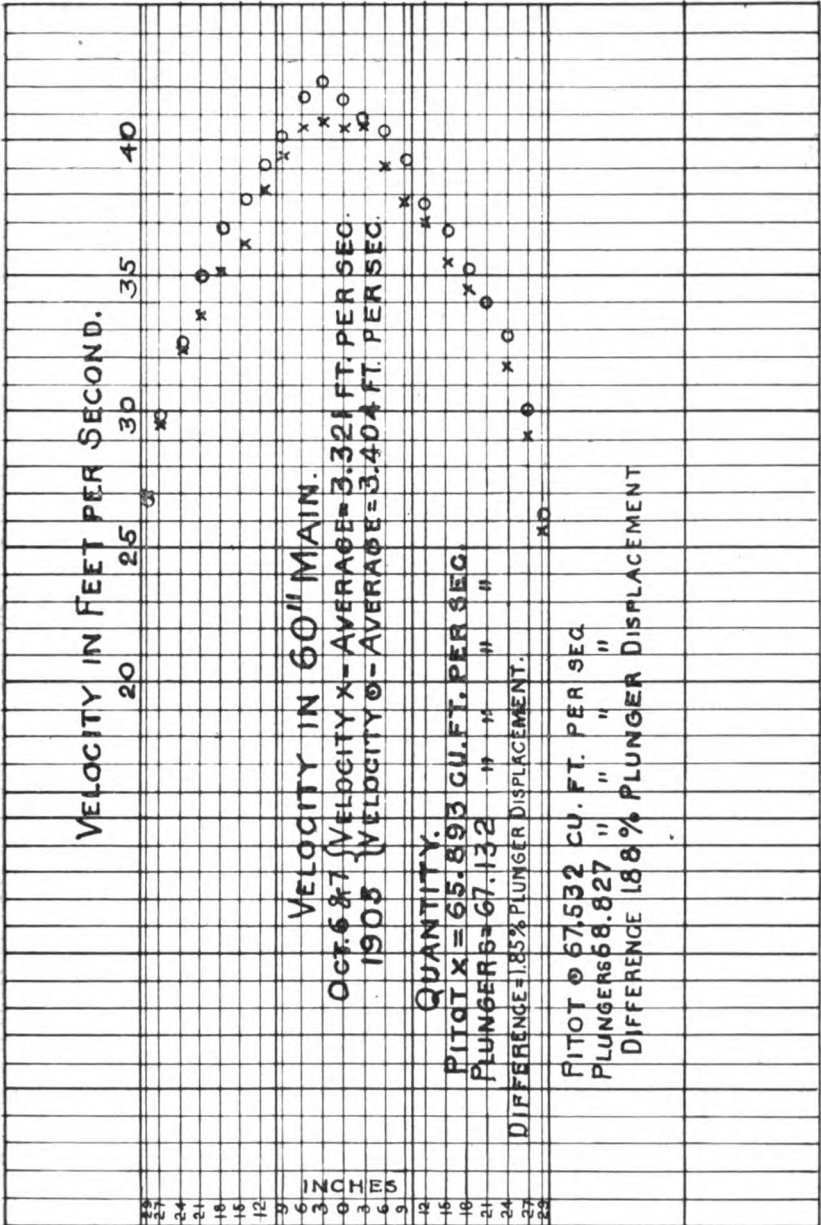
(Signed) C. H. ANDERSON.



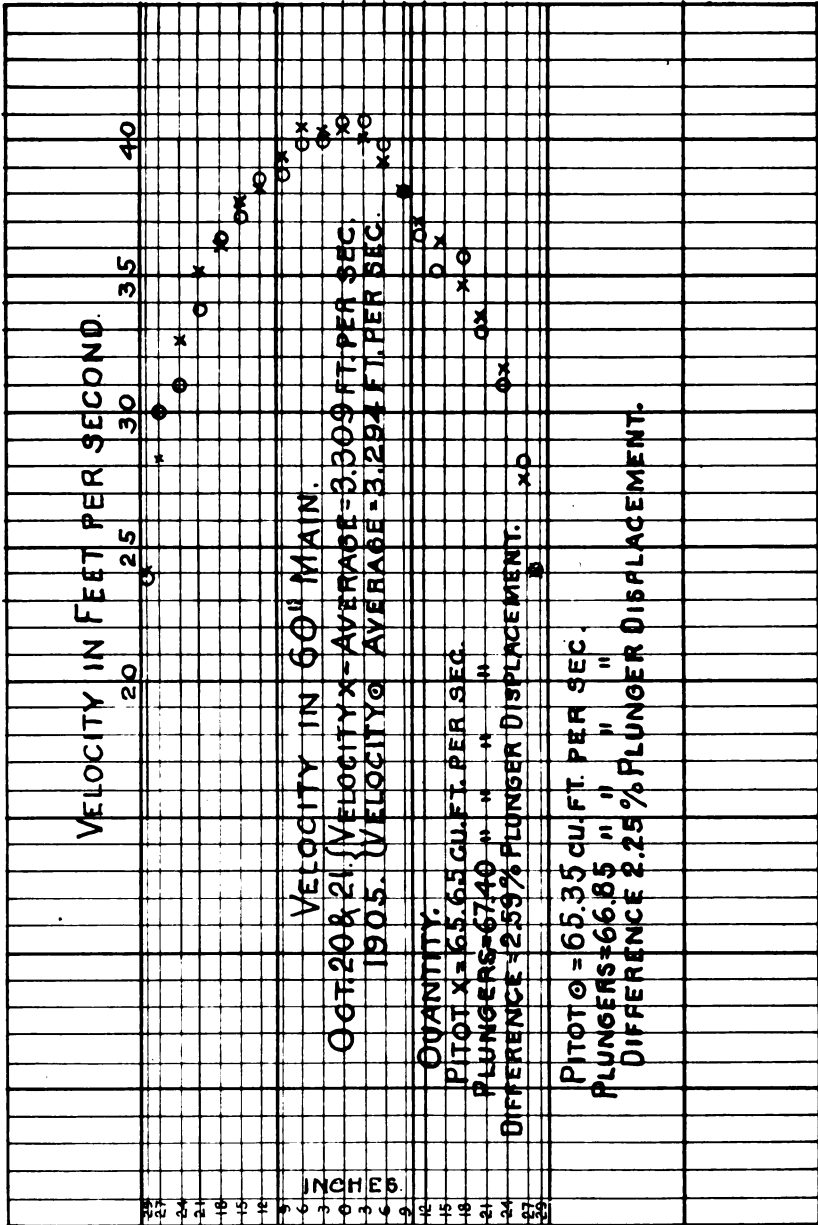
OCT. 6-7-1905.
 DIAGRAM No. 1.



OCT. 20-21, 1905.
 DIAGRAM No. 2.



TO CENTER OF PIPE.
 STATION DISTANCE.
 DIAGRAM NO.3.



TO CENTER OF PIPE.
 STATION DISTANCE.
 DIAGRAM No.4.

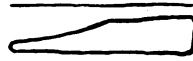
533 H.P.T.
3.20 P.M.



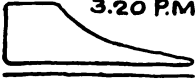
533 I.P.T.
3.20 P.M.



533 L.P.T.
3.20 P.M.



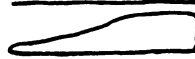
533 H.P.B.
3.20 P.M.



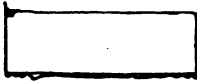
533 I.P.B.
3.20 P.M.



533 L.P.B. 3.20 P.M.



533-H. 3.20



OCT. 6. 05
533-I. 3.20



533-L. 3.20



DIAGRAM No.5.

534 H.T.
3.20 A.M.
OCT. 7.



534-I.T
3.20 A.M.
OCT. 7.



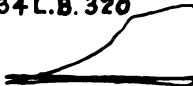
534 L.T.
3.20 A.M.
OCT. 7.



534 H.B. 3.20



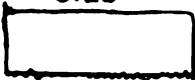
534 L.B. 3.20



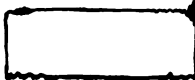
534 L. B. 3.20



534 H.
3.20



534-I
3.20



534 L
3.20

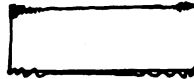


DIAGRAM No.6.

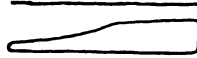
532 H.T.
4.50 P.M. OCT. 20.



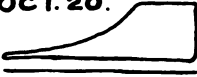
532 I.T.
4.50 P.M. OCT. 20.



532 L.T.
4.50 P.M. OCT. 20.



532 H.B. 4.50
OCT. 20.



532 I.B. 4.50
OCT. 20.



532 L.B. 4.50
OCT. 20.



532 H. 4.50 OCT. 20



532-I 4.50 OCT. 20



532 L. 4.50 OCT. 20



DIAGRAM No 7

534 H.T. 6.15 A.M.
OCT. 21.



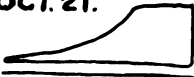
534 I.T. 6.15
OCT. 21.



534 L.T. 6.15
OCT. 21.



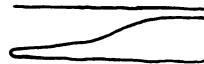
534 H.B. 6.15
OCT. 21.



534 I.B. 6.15
OCT. 21.



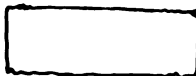
534 L.B. 6.15
OCT. 21.



534 H. 6.15
OCT. 21.



534 I. 6.15
OCT. 21.



534 L. 6.15 A.M.
OCT. 21.

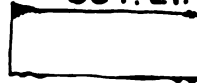
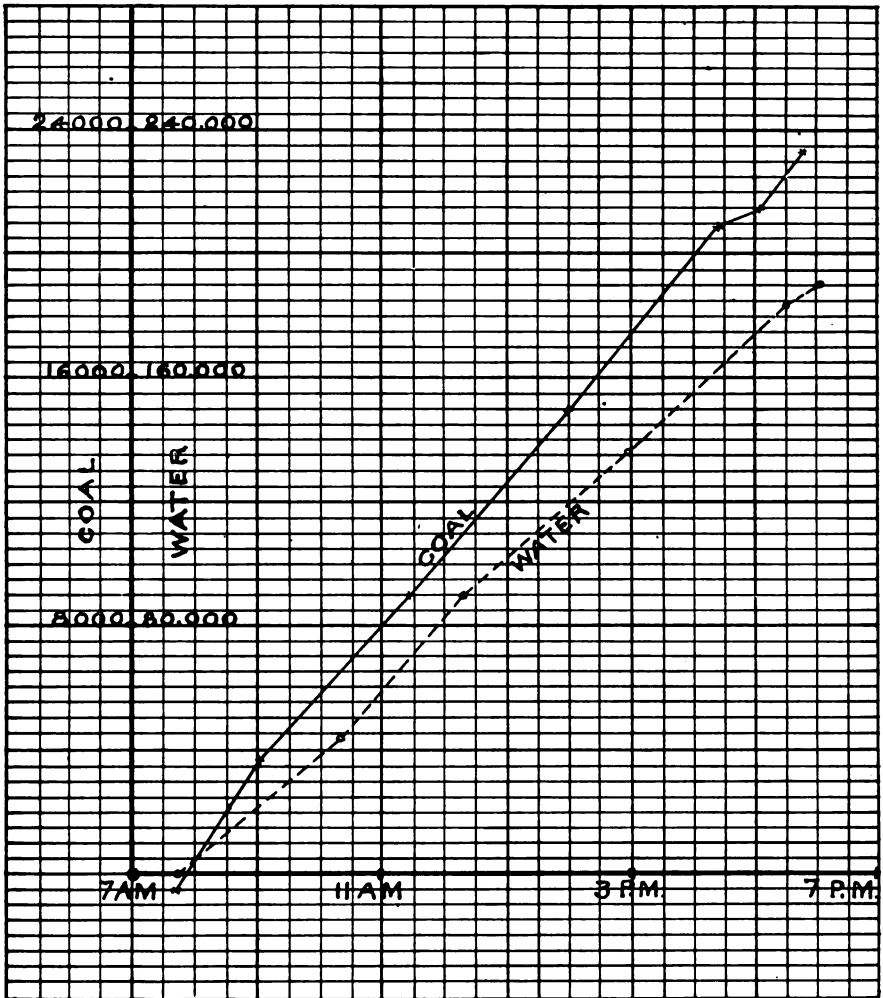


DIAGRAM No. 8.



OCT. 27 - 1905.
 DIAGRAM No. 9.

ANNUAL REPORT

OF THE

BUREAU OF HIGHWAYS

FOR THE

YEAR ENDING DECEMBER 31, 1905

OFFICERS
OF THE
BUREAU OF HIGHWAYS

Chief of Bureau,
J. A. HUNTER.

Assistant to Chief,
FRANK E. SMITH.

District Assistants,
CHARLES E. VOGDES, First District.
SAMUEL J. SHANNON, Second District.
ROBERT W. FAGAN (acting), Third District.
HIRAM A. MILLER, Fourth District.
JOHN E. MANSHIP (acting), Fifth District.
JOHN L. FLOOD, Sixth District.

Superintendent of Bridges,
JOSEPH H. COFRODE.

Assistant Superintendent of Bridges,
WILLIAM G. HOUSTON (acting).

Inspector of Sewer Repairs,
JOHN D. HEVENER.

Chief Clerk,

MALCOLM M. COPPUCK.

Assistant to Chief Clerk—BENJ. B. BRANNAN.

Contract Clerk—M. L. FINCKEL, JR.

Bill Clerk—WALTER R. BERRY.

Assistant Bill Clerk—PHILIP A. ALLEN.

License Clerk—RICHARD D. WESTPHAL.

Miscellaneous Clerk—HENRY A. MACREADY.

Miscellaneous Clerk—T. WALLIS AITKEN.

Miscellaneous Clerk—

Miscellaneous Clerk—EDWARD W. KELLY.

Reference and Complaint Clerk—JOHN A. WOLFF.

Stenographer, Typewriter and Clerk—SAMUEL COLLINS.

Stenographer and Typewriter—THOMAS P. KELLY.

Messenger—ANDREW W. COSTELLO.

District Inspectors,

GEO. W. MINK, First District.

GEO. W. EVANS, First District.

WILLIAM GODFREY, Second District.

R. LINCOLN ROBERTS, Second District.

_____, Second District.

JOSEPH FRANKLIN, Third District.

GEO. T. HOOVER, Third District.

_____, Third District.

WM. B. SCOTT, Fourth District.

RICHARD WILDEY, Fourth District.

JOSEPH R. ASH, Fifth District.

JAMES C. MATEER, Fifth District.

HENRY T. STACKHOUSE, Sixth District.

ALONZO KNIGHT, Sixth District.

Inspectors of Electrical Connections.

SAML. J. YOUNG (acting).

GEORGE BETTS.

THOMAS McKAY.

HARRY KEFFER.

Inspectors of Repairs to Asphalt Pavements.

WILLIAM LAMOND.

GEO. A. BULLOCK (acting).

Special Inspectors.

JOHN R. LLOYD.

SAMUEL C. WAGNER.

CHAS. J. MORRISON.

GEO. H. DeHAVEN.

GEO. J. FIELTIZ.

JOHN PHILLIPS.

GEO. W. SPIELMAN.

CHARLES S. WHITING.

ELMER E. FLOOD.

BENJAMIN L. TAYLOR.

WILLIAM H. SIEGEL.

GEO. W. STEINBACH.

HOWARD L. KLOTZ.

JOHN E. JONES.

JAMES J. CRAIG.

W. H. SIMON.

M. G. BRIGGS.

ANNUAL REPORT
OF THE
BUREAU OF HIGHWAYS
FOR THE YEAR 1905

Philadelphia, January 17, 1906.

A. LINCOLN ACKER, ESQ.,
Director, Department of Public Works.

DEAR SIR:—I herewith submit annual report of work done by the Bureau of Highways, for the year ending December 31, 1905:

Summary of Receipts and Expenditures.

The total amount of money available for all purposes for the year 1905 was \$3,101,329.60, which includes the amount brought forward from previous years; out of this sum, \$1,587,760.50 was paid out on warrants countersigned,—the sum of \$6,511.52 merged at the end of the year; and \$1,507,057.58 was carried forward to the year 1906.

The receipts of the bureau, representing amounts paid to the Receiver of Taxes on account of licenses, permits, etc., were \$225,213.20.

The number of permits issued by this Bureau is 27,924.

The work of this bureau for the past year included 405 contracts; of which 177 were for paving, 80 for grading, 49 for re-paving, 64 for macadamizing, and 35 of a miscellaneous nature.

Summary of Work Done—1905.

The following table gives a summary of the work done during the year 1905, and the corresponding amount of work done during the years 1903 and 1904.

	1903	1904	1905
New paving	117,099	91,348	108,101 lin. ft.
Macadamizing (new)	141,888	32,900	23,390 lin. ft.
Grading	1,097,522	1,120,946	991,401 cu. yds.
New footway paving	57,433	76,166	79,385 sq. yds.
Repairs to paved streets	391,064	370,868	580,443 sq. yds.
Footways repaved	18,491	37,135	22,172 sq. yds.
Ditches repaved	50,329	55,338	56,136 sq. yds.
Gutter stone laid	4,930	.....	..... lin. ft.
Crossing stone laid	8,394	7,384	6,235 lin. ft.
Curbstone reset	106,244	155,991	114,963 lin. ft.
Wooden trunks	12,467	10,147	5,675 lin. ft.
Brick and stone drains	1,981	1,528	927 lin. ft.
Hand railings	4,900	4,093	4,944 lin. ft.
Curved curb corners	10,247	16,089	10,540 lin. ft.
New curbstone set	175,921	219,756	148,217 lin. ft.
Vitrified brick and stone gutters	5,670	23,963	11,480 lin. ft.
Resurfacing, sheet asphalt..	10,672	15,807	3,169 sq. yds.
Resurfacing, broken stone ..	132,809	110,765	62,540 lin. ft.
Footway, curb and railroad notices served	25,732	31,705	25,734

Grading.

During the year 1905, about twenty-one (21) miles of new streets were opened and graded to the established grade of the city; this work amounted to 991,401 cubic yards of excavation and fill.

New Paving.

Twenty and forty-seven one hundredths (20.47) miles of streets, amounting to three hundred and thirty-two thousand and fifty-two (332,052) square yards of surface were paved by the City and by private contract, under ordinance passed September 12, 1905.

This pavement was of refined natural asphalt, granite block, vitrified fire clay and shale brick, all laid upon cement concrete foundation, six (6) inches in thickness.

Repaving with Improved Pavement.

On five and one-half ($5\frac{1}{2}$) miles of streets, new and improved pavement with six (6) inch cement concrete foundation was laid, replacing old cobble and rubble pavements on these streets.

This Bureau had available for this purpose at the beginning of the year one hundred and seventy-five thousand and ten (175,010) dollars and ninety-eight (98) cents; of this amount, one hundred and forty-one thousand six hundred and forty-eight dollars (141,648) dollars and forty-one (41) cents was expended, thirteen hundred and eighty-six (1,386) dollars and fifty-five (55) cents transferred to other items and thirty-one thousand nine hundred and seventy-six (31,976) dollars and two (2) cents carried forward to 1906.

In this connection I would respectfully urge the importance of having a generous appropriation made for this work in the future, as there are a great number of main thoroughfares in the City paved with this old style of pavement: cobble and rubble, which are a constant wear to the horses and wagons passing over them daily.

Unpaved and Macadamized Public Highways.

These roads were kept in a good state of repair during the past year, under the contract for this work.

One hundred and twenty-two thousand two hundred and thirteen (122,213) square yards of resurfacing was done on different roads, under the supervision of this bureau. Four and forty-three one hundredths (4.43) miles of new macadam roads were built during the past year; this with

the resurfacing, would make about sixteen (16) miles of resurfacing, and practically new roads.

The sprinkling of macadam roads was well attended to during the season, from April to November 1, 1905.

Repairs to Paved Streets..

This contract was let for the lump sum of one hundred and twenty-seven thousand (127,000) dollars. This method was found very unsatisfactory. It also caused a great deal of annoyance to the Department and made a vast amount of extra work for this Bureau to compel the work to be done according to the terms of the contract and specifications.

The repairs to asphalt and granolithic streets were made promptly and in a thorough and workmanlike manner,—the appropriation for this class of work was entirely too small for the amount of work required, and only by making transfers from other items during the latter months of the year was the Bureau able to do the most needed repairs.

A great number of openings were made in the streets during the past year for placing pipes, conduits and connections by telephone, telegraph, electric light companies, and by the United Gas Improvement Company.

The following is a detailed statement of work done by these companies:—

United Gas Improvement Company.

Streets opened for laying mains	36 miles.
Number of openings made for house connections	19,000
Number of openings for overhauling	6,000
Number of openings for leaks and repairs	6,000
Repaving over openings, granite blocks	40,000 sq. yds.
Repaving over openings, sheet asphalt	11,400 sq. yds.
Repaving over openings, vitrified bricks	7,700 sq. yds.

Bell Telephone Company.

Streets opened for laying conduits	96.6 miles.
Repaving over openings, granite blocks	83,931 sq. yds.
Repaving over openings, sheet asphalt	40,842 sq. yds.
Repaving over openings, vitrified bricks	18,927 sq. yds.

Keystone Telephone Company.

Streets opened for laying conduits	38.416 miles.
Repaving over openings, belgian blocks	29,167 sq. yds.
Repaving over openings, sheet asphalt	17,437 sq. yds.
Repaving over openings, vitrified bricks	6,315 sq. yds.
Repaving over openings, granolithic	2,122 sq. yds.
Repaving over openings, asphalt blocks	812 sq. yds.
Repaving over openings	3,652 sq. yds.
Repaving over openings, brick footways	3,929 sq. yds.

Resurfacing with Sheet Asphaltum.

This work for the past year consisted of making repairs on streets on which the guarantee for maintenance had expired, and on other streets which still remain under guarantee.

On account of the limited amount of funds for the contract for repairs to asphalt streets, only the most disintegrated spots could be repaired.

Repairs to Sewers.

This work during the past year was done in a prompt and efficient manner. There were no breaks of a serious nature during the year.

The sewers were well cared for and the contractor was compelled to clean the large sump at the Manayunk Canal, thus establishing a precedent in the matter for coming years.

Repairs to Bridges.

The appropriation for this work during the past few years has been entirely inadequate for the amount of repairs required. This is a matter to which I would respect-

fully call the attention of the Department, with a view to having this appropriation increased until it is commensurate with the urgent needs of the case. Many bridges are fast deteriorating for the want of painting, some are in an unsafe condition for the want of repairs, and a great number show evidence of long years of neglect. Attached hereto will be found a detailed statement and report from the Superintendent of Bridges, to which I respectfully refer you.

Boulevards.

Work on the Northeast Boulevard was suspended in June, 1905, by order of the Director, Department of Public Works, because it was believed that the work was not being prosecuted according to the requirements of the contract and specifications. Inasmuch as this matter is still under advisement, I think it unnecessary to say more on the subject.

Work on the Southern Boulevard, from Moyamensing avenue to League Island Park has progressed steadily during the past year, and at this time a large percentage of the filling is completed.

This work is being conducted in such manner as to provide amply for the vehicles and street railway travel; the contractor for this work is exercising every care to exclude all material of an objectionable nature from the filling being placed.

When this boulevard is completed it will greatly add to the attractiveness of this section of the City.

Correspondence.

There were received by this Bureau during the year 1905, twenty-seven thousand and forty-two letters and communications. There were sent out twenty-eight thousand one hundred letters. The total correspondence of this

Bureau amounted to eighty-eight thousand papers of record for the year 1905. This is an increase of 1100 communications over the correspondence for the year 1904.

In addition to the above there are thousands of police reports and reports of work on the highways, which are also recorded.

Railway Companies.

The several passenger railway companies operating in this City made repairs on streets over which they pass amounting to four hundred and eighty-nine thousand and sixty-nine (489,069) square yards, divided as follow:

Repairs to granite block pavement	369,353 square yards
Repairs to sheet asphalt pavement	109,801 square yards
Repairs to brick pavement	9,915 square yards
	489,069 square yards

The Philadelphia Rapid Transit Company removed the old paving from between rails and substituted therefor 40,794 square yards of granite blocks and 3,511 square yards of vitrified fire clay blocks. They also re-surfaced the asphalt pavement on the shoulders of streets occupied by their tracks to the extent of 181,704 square yards; and in addition thereto made repairs to macadam roads amounting to 8,703 square yards, and repaved granite block streets to the extent of 320,815 square yards.

New tracks were laid on 3.05 miles of streets, making a total of 452.64 miles occupied by passenger railway tracks in this City.

All of this work was done under the supervision of this Bureau.

Appended hereto will be found the reports of the Chief Clerk, License Clerk, Superintendent of Bridges, Board of Highway Supervisors, and the Chief Draughtsman of the Board of Highway Supervisors; also details of work by the Bureau of Highways.

In conclusion, I wish to thank you for your uniform courtesy and consideration; and I desire to thank your able assistant, Mr. Thomas L. Hicks, whose familiarity with the workings of this Bureau has enabled him to render us very valuable assistance.

Also, I would express my gratitude to all of the officials in this Bureau, for their cheerful assistance, hearty co-operation, and faithful work.

Respectfully submitted,

J. A. HUNTER,
Chief, Bureau of Highways.

ANNUAL REPORT
OF THE
CHIEF CLERK
FOR YEAR ENDING 1905

Philadelphia, December 31, 1905.

J. A. HUNTER, Esq.,
Chief, Bureau of Highways.

DEAR SIR:—Accompanying please find report of the appropriations to the Bureau of Highways, with the expenditures and amounts merging, for the year 1905.

Very truly,
MALCOLM M. COPPUCK,
Chief Clerk.

Report of the Appropriations and Expenditures of the Bureau of Highways for the year 1905.

Item.	For	Appropriation.	Counter-siged	Merging.	Not Merging.
1	Officer's salaries	\$70,691 15	\$70,557 83	\$133 32	
2	Paving intersections and unassessable property	80,051 94	10,489 10	.....	\$19,562 84
2½	Paving intersections and unassessable property	89,382 75	12,475 24	.....	26,857 51
3	Repairs to paved streets	165,000 00	38,000 00	.....	127,000 00
4	Repairs to roads, drains and small bridges	249,000 00	248,689 20	310 80	
5	Repairs to sewers, inlets and cleaning sewers	45,000 00	45,000 00		
6	Grading streets and roads	232,879 57	64,687 99	1,557 55	166,634 03
Loan 6	Grading streets and roads	213,141 13	115,650 15	.....	98,000 98
Loan 6½	Grading streets and roads	8,204 14	6,643 82	.....	1,560 32
7	Repairs to bridges	139,413 03	139,413 03		
8	Expenses of the Board of Highway Supervisors	10,647 83	10,563 68	54 15	
9	Advertising	800 00	586 45	213 55	
10	Rent of district offices	1,372 00	1,372 00		
11	Incidentals and office expenses	1,800 00	1,800 00		
12	Hauling and yard expenses	984 20	979 20	5 00	
13	Repairs to meadow banks	1,985 50	1,985 50		
14	Salaries of bridge watchmen and engineers	32,971 60	32,966 20	5 40	
15	Repaving and repairing footways	9,030 00	8,866 47	133 53	

Report of the Appropriations and Expenditures of the Bureau of Highways—Continued.

Item.	For.	Appropriation.	Counter-signed.	Merging.	Not Merging.
16	Repairing tramway streets.....	\$9,897 68	\$8,358 52	.....	\$1,544 14
17	Keep of horses for chief, assistants and inspectors	12,962 37	12,572 37	\$290 00	.....
18	Curbed curbing	11,000 00	10,910 08	89 97	.....
19	Salaries of temporary inspectors.....	11,662 50	11,656 72	5 78	.....
20	Emergencies.....	10,020 50	10,020 50	.....	.....
21	Surfacing and re-surfacing unpaved streets and roads.....	62,724 51	23,718 51	.....	39,006 00
Loan 21½	Surfacing and re-surfacing unpaved streets and roads.....	12,582 58	11,258 21	.....	1,324 37
Loan 21¾	Surfacing and re-surfacing unpaved streets and roads.....	19,141 83	4,414 08	.....	14,727 75
Loan 21¾	Surfacing and re-surfacing unpaved streets and roads.....	589 49	.....	.....	589 49
22	Improving water courses in the 26th, 36th, 38th and 40th wards.....	5,000 00	5,000 00	.....	.....
23	Repairs to asphalt streets and breaks in footways.....	70,000 00	69,517 92	482 08	.....
24	Grading, paving, etc., streets between Lehigh and Susquehanna avenues and others.....	5,000 00	4,987 12	.....	12 88
25	Completing contract for grading, paving, etc., of streets between Trenton avenue and Thompson street and others.....	275,000 00	181,184 59	.....	193,815 41
Loan 25	Continuing the work of grading, etc., of Tullip street, etc.....	64,764 23	7,126 57	.....	57,637 66
26	To bring Moyer, Almond, Sergeant and Gaul streets, etc., to revised grade.....	47 30	.....	.....	47 30
Loan 26	Improvement of parkway between West Logan Square and 25th street.....	300,000 00	.....	.....	300,000 00

Report of the Appropriations and Expenditures of the Bureau of Highways—Continued.

Item.	For	Appropriation.	Counter-signed.	Merging.	Not Merging.
27	Repaying with improved pavement streets not occupied by passenger railroads	\$2,278 95	\$1,138 45	.....	\$1,140 50
Loan 27	Repaying with improved pavement streets not occupied by passenger railroads	171,845 48	140,809 96	.....	31,835 52
28	Extending contract for re-surfacing Grant street	29 10	.....	\$29 10	.....
29	Retained percentage on certain contracts for repaving	379 56	.....	.....	379 56
Loan 30	Retained percentage on certain contracts for repaving	3,883 51	.....	.....	3,883 51
Loan 31	Retained percentage on certain contracts for repaving	131 72	.....	.....	131 72
Loan 32	Improving Boulevard from Broad street northeastward	332,743 52	46,918 44	.....	285,825 03
33	Changing grade of Market street from 22d to 30th street	23,000 00	14,000 00	.....	9,000 00
34	Grading, paving, etc., Edgemont street from Allegheny avenue to Westmoreland, etc.	11,500 00	8,298 71	8,201 29	.....
Loan 35	Improving South Broad street	408,711 00	238,293 55	.....	169,417 45
36	Grading, paving, etc., streets between Allegheny avenue and Wheat Street Lane, etc.	25,000 00	14,663 39	.....	10,336 61
	Total	\$3,101,329 60	\$1,587,760 50	\$6,511 52	\$1,507,057 58

MALCOLM M. COPPUCK,

Chief Clerk.

ANNUAL REPORT
OF THE
LICENSE CLERK
FOR THE YEAR 1905

Philadelphia, January 1, 1906.

J. A. HUNTER, Esq.,
 Chief, Bureau of Highways.

DEAR SIR:—The following items represent the permits and licenses issued by this Bureau for the year ending December 31, 1905:

Permits for removal of street pavements....	\$41,964.25
Permits for placing building material upon the street	1,016.50
Permits for constructing vaults under side- walks	1,638.28
Licenses for drays, carts, wagons and barrows	3,326.35
Licenses for hotel, private and hackney coaches	1,210.00
Licenses for passenger railway cars	116,416.25
Licenses for awnings	1,113.00
Licenses for drivers	15.00
Miscellaneous	58,513.67
Total	\$225,213.20
Number of permits issued	27,924

Respectfully submitted,

R. D. WESTPHAL,
License Clerk.

Passenger Railway Car Licenses.

	1905.		
	Bridge.	Full.	Special.
Philadelphia Rapid Transit Co.....	278	2,000	
Roxborough, Chestnut Hill and Norristown Passenger Railway Co.....		21	880
Holmesburg, Tacony & Frankford Electric Railway Co.....		16	201
Southwestern Street Railway Co.....		9	284
Total	278	2,046	865

ANNUAL REPORT
 OF THE
SUPERINTENDENT OF BRIDGES
FOR THE YEAR 1905

Philadelphia, January 1, 1906.

MR. J. A. HUNTER,
 Chief, Bureau of Highways.

DEAR SIR:—I herewith submit report of work done upon repairs and maintenance of bridges during the year ending December 31, 1905:

A

The amounts expended for repairs to bridges and location of structures are shown by the following schedule:

1. Glenwood avenue over North Penn railroad....	\$657 10
2. Byberry road over Poquessing creek.....	1,723 00
3. Wayne avenue over Chestnut Hill Branch of the P. R. R.....	580 15
4. Academy road over Byberry creek	6,002 45
5. Somerset street over Richmond Branch P. & R. Ry.	298 25
6. Krewstown road northeast of Welsh road	3,436 30
7. Second street over Richmond Branch P. & R. Ry.	2,561 40
8. Old Second street over Wingohocking creek ...	599 60
9. Green lane over Schuylkill river, Manayunk ...	812 00
10. Calumet street over the Germantown and Nor- ristown Branch of the P. & R. Ry.	439 75
11. Spring Garden street over Schuylkill river	16,607 65

12. Thirty-fourth street over P. R. R.	3,284 10
13. Penrose ferry over Schuylkill river	3,332 40
14. Sixty-third street over P. B. & W. R. R.	950 45
15. Orthodox street over Frankford creek	2,650 10
16. Front street over Richmond Branch P. & R. Ry.	995 60
17. Sixth street over Richmond Branch P. & R. Ry.	1,947 00
18. South street over the Schuylkill river	78 75
19. Wissahickon avenue west of Carpenter street..	1,569 35
20. City avenue over Schuylkill river	2,469 55
21. Columbia avenue over P. & R. Ry.	31 20
22. Foulkrod street over Little Tacony creek	243 90
23. Wissahickon avenue over Fountain run	8,981 65
24. Edison avenue over Poquessing creek	4,548 71
25. Knight's road over Poquessing creek	290 90
26. Ontario street over P. & R. Ry. at Nineteenth street	516 40
27. Rhawn street over Pennypack creek	2,635 25
28. Frankford avenue over Pennypack creek	1,409 50
29. Walnut street over Schuylkill river	840 50
30. Lamb Tavern road over P. R. R.	4,385 40
31. Lyon's avenue over Kingsessing creek	903 90
32. Glenwood avenue over P. & R. Ry. at Fifteenth street	949 80
33. Gorgas lane near Wissahickon park	3,138 35
34. Moyamensing avenue over Hollander's creek ..	226 65
35. Asylum pike over branch of Tacony creek	2,569 90
36. Stone House lane over Swanson canal	781 95
37. Weccacoe avenue over waterway at Shunk street	103 90
38. Carpenter street at Pelham, Germantown	285 70
39. McCallum street over Cresheim creek	1,866 50
40. Oxford street over Little Tacony creek	98 70
41. Gray's Ferry road over Schuylkill avenue	161 15
42. Broad street and Lehigh avenue over P. & R. Ry.	7,439 10
43. Church street over Little Tacony creek	102 90
44. Repairs to watch houses on Schuylkill river bridges and emergency work	275 20
45. Bustleton pike north of Axe Factory road....	6,243 35
46. Maple avenue over Poquessing creek	3,965 90
47. Oxford pike over Sandy run	4,830 30
48. Oxford pike over Tackawauna creek	4,331 65
49. Bustleton pike over Poquessing creek	3,767 25
50. Ashbourne street near State road	70 90

51. Oxford pike at Golf grounds	859 00
52. Market street over Schuylkill river	2,280 45
53. Wissahickon road over Northwestern avenue...	3,467 80
54. Welsh road east of Pine road	6,691 80
55. State road near Ashbourne street	166 50
56. Oxford pike south of Church lane	4,141 90
57. Byberry and Bensalem pike near Red Lion road	1,628 90
58. Tomlinson road west of Bustleton pike	1,460 35
59. Clarissa street over P. & R. Ry.	34 40
60. Byberry road over Byberry creek	1,480 10
61. Mechanicsville bridge over Poquessing creek, ½ cost of repairs paid by Commissioners of Bucks county	790 79
62. Broad street over Richmond Branch of P. and R. Ry. For miscellaneous items, trans- portation, etc., as per approved bills.....	155 50
Total	\$141,099 89

B.

To meet the above expenditures, there was provided the following sums:

Appropriation by ordinance of Councils to Item 7, dated December 31st, 1904.....	\$100,000 00
Transferred by ordinance dated Aug. 1st, 1905....	35,000 00
Transferred by ordinance dated Dec. 28th, 1905....	4,413 03
Paid from Item 20, for emergencies.....	1,686 86
Total	\$141,099 89

C.

The expenditures charged to Items 1 and 14 were as follows:

For salaries of Superintendent of Bridges and As- sistant Superintendent of Bridges, Item 1.....	\$2,960 00
For salaries and uniforms of bridge operators, en- gineers and watchmen, Item 14.....	32,966 20
Total	\$35,926 20

D.

The number and kind of bridges maintained by the City and under the supervision of the Bureau of Highways is as follows:

Steel and iron structures	126
Stone and brick structures	87
Wood and stone structures	95
Concrete structures	23
Total	331

E.

Receipts and Claims.

Bills have been made and forwarded to the Commissioners of Montgomery County, for one-half the cost of repairs to the bridge at Green lane over Schuylkill river, Manayunk, or.....	\$561 46
Bill for one-half of the cost of repairs to the bridge at Garrett's road over Cobb's creek, has been received and approved, for.....	692 50

The number of men employed at the end of the year 1905, as engineers, operators and watchmen on City bridges is:

Engineers and operators on draw-bridges	6
Watchmen	41
Total	47

The total estimated value of city bridges under the care and jurisdiction of the Bureau of Highways is\$21,000,000 00.

Total.

The amounts appropriated by Councils for the maintenance and repair of these bridges, for the five years from 1901 to 1905, inclusive, were as follows:

For the year 1901	\$91,694 00
For the year 1902	90,000 00
For the year 1903	66,963 00
For the year 1904	75,000 00
For the year 1905	135,000 00

The percentage of value of the bridges for each year was:
 1901, seven-tenths of one per cent..... (.007%)
 1902, seventy-six one hundredths of one per cent..... (.0076%)
 1903, one-half of one per cent..... (.005%)
 1904, thirty-four one hundredths of one per cent..... (.0034%)
 1905, sixty-four one hundredths of one per cent..... (.0064%)

As is shown by the schedule, repairs were made to a large number of structures during the year 1905, and a number of the old and worn out bridges have been rebuilt, and others effectively repaired, and the cost of maintenance of these will be slight for a number of years to come.

Nine new concrete and four stone arch bridges were constructed, replacing old and worn out material and structures, at the following named places:

Concrete Arches.

Edison avenue over Poquessing creek.
 Maple avenue over Poquessing creek.
 Bustleton pike over Poquessing creek.
 Krewstown road northeast of Welsh road.
 Tomlinson road west of Bustleton pike.
 Byberry and Bensalem pike north of Red Lion road.
 Academy road over Byberry creek.
 Wissahickon road and Northwestern avenue.
 Gorgas lane near Wissahickon drive.

Stone Arch Bridges.

Bustleton pike north of Axe Factory road.
 Oxford pike over Tackawanna creek.
 Oxford pike over Sandy run.
 Oxford pike south of Church lane.

Extensive repairs, that amount to a practical reconstruction of three large stone arch structures at

Wissahickon avenue near Fountain run.
 Wissahickon avenue west of Carpenter street.
 Welsh road near Pine road.

A large amount has been expended upon repairs to the bridge at Spring Garden street, over the Schuylkill river, and a large sum is still needed to be expended to place this bridge in a good condition of repair.

The bridge at Broad street and Lehigh avenue has been repaired. The impaired and broken parts of the metal work have been re-enforced and renewed with new metal.

The iron work has been cleaned and painted, and the entire bridge has been encased in a wooden sheathing that will protect it from the damaging corrosive effects of locomotive smoke and gases.

This work has been thoroughly well done under the contract for furnishing labor, tools and machinery for repairs to bridges, in full and strict accordance with the plans and specifications upon which proposals were received at the letting held August 19, 1903, at a cost of at least two thousand (2,000) dollars less than the lowest bid received, or a net gain to the City of 20%.

The western section of Spring Garden street bridge, the bridge at Belmont avenue and Girard avenue over the P. R. R., and the bridge at Fifth street over the North Penn Railroad are all in a dangerous condition. These bridges have been adjudged to be so far deteriorated as to be beyond repair, and have been referred to the Bureau of Surveys for designs for new structures. It is essentially necessary that immediate action be taken, looking to the replacement of these bridges. All of them are in a dangerously worn out condition.

A new and substantial temporary wooden bridge has been completed at South Broad street over the tracks of the Pennsylvania Railroad. The preparation of the plans and the construction of the bridge has been done under my supervision and direction.

The approximate estimate of the amount of money which will be needed for painting and repairing, as given in the schedules submitted to you in December, 1905, is \$210,950.

The entire work of supervising repairs to bridges, the clerical work and draughting incident thereto, have been performed by the Superintendent and Assistant Superintendent and this work cannot be as efficiently done as it should be, by the present limited force. A draughtsman is required to assist in the office work.

Mr. Frank C. Watson, former Assistant Superintendent of Bridges, resigned on November 11, 1905, and Mr. William G. Houston was assigned as his successor, on November 24, 1905, and has since then attended to the duties of his office in a commendable manner.

In conclusion, I beg to thank you for the courtesies and kind assistance you have extended to me in the performance of my duties.

Yours very truly,

JOS. H. COFRODE,
Superintendent of Bridges

Detailed statements of quantities and character of work done during the year 1905, classified and arranged for ready reference, together with classification of all pavements and sidewalks laid and the average cost of each class of pavements for the years 1903, 1904, and 1905.

NEW PAVING.

Granite Blocks.

Second District	2,258 sq. yds.....or.....	764 lin. ft.
Third District	5,588 sq. yds.....or.....	1,387 lin. ft.
Fourth District	24,344 sq. yds.....or.....	9,752 lin. ft.
Fifth District	1,331 sq. yds.....or.....	445 lin. ft.
Total	23,491 sq. yds.....or.....	12,348 lin. ft.

Sheet Asphalt.

First District	115,789 sq. yds.....or.....	26,840 lin. ft.
Second District	4,988 sq. yds.....or.....	2,126 lin. ft.
Third District	12,594 sq. yds.....or.....	4,125 lin. ft.
Fourth District	14,591 sq. yds.....or.....	5,792 lin. ft.
Fifth District	1,528 sq. yds.....or.....	520 lin. ft.
Sixth District	3,445 sq. yds.....or.....	1,440 lin. ft.
Total	152,935 sq. yds.....or.....	40,843 lin. ft.

Vitrified Bricks.

First District	4,751 sq. yds.....or.....	1,237 lin. ft.
Second District	3,083 sq. yds.....or.....	1,906 lin. ft.
Fourth District	1,066 sq. yds.....or.....	620 lin. ft.
Fifth District	9,956 sq. yds.....or.....	3,111 lin. ft.
Sixth District	3,728 sq. yds.....or.....	1,636 lin. ft.
Total	22,584 sq. yds.....or.....	8,510 lin. ft.

Macadamizing.

Third District	1,161 sq. yds.....or.....	443 lin. ft.
Fourth District	937 sq. yds.....or.....	527 lin. ft.
Fifth District	23,358 sq. yds.....or.....	11,399 lin. ft.
Sixth District	20,669 sq. yds.....or.....	11,021 lin. ft.
Total	46,125 sq. yds.....or.....	23,390 lin. ft.

NEW PAVING—PRIVATE CONTRACT.

Sheet Asphalt.

First District	21,327 sq. yds.....or.....	7,840 lin. ft.
Second District	8,948 sq. yds.....or.....	4,148 lin. ft.
Third District	485 sq. yds.....or.....	203 lin. ft.
Fourth District	1,645 sq. yds.....or.....	775 lin. ft.
Total	32,405 sq. yds.....or.....	12,966 lin. ft.

Vitrified Bricks.

First District	4,421 sq. yds.....or.....	1,200 lin. ft.
Second District	3,424 sq. yds.....or.....	1,720 lin. ft.
Fourth District	783 sq. yds.....or.....	500 lin. ft.
Fifth District	2,859 sq. yds.....or.....	661 lin. ft.
Total	11,487 sq. yds.....or.....	4,081 lin. ft.

NEW PAVEMENT BY SUBSTITUTING IMPROVED PAVEMENT
FOR COBBLE AND RUBBLE.*Granite Blocks.*

Second District	3,539 sq. yds.....or.....	1,949 lin. ft.
Third District	1,476 sq. yds.....or.....	467 lin. ft.
Fourth District	24,557 sq. yds.....or.....	7,552 lin. ft.
Total	29,572 sq. yds.....or.....	9,968 lin. ft.

Sheet Asphalt.

First District	32,143 sq. yds.....or.....	8,500 lin. ft.
Second District	6,090 sq. yds.....or.....	2,641 lin. ft.
Third District	9,038 sq. yds.....or.....	2,029 lin. ft.
Fourth District	4,557 sq. yds.....or.....	1,852 lin. ft.
Sixth District	1,108 sq. yds.....or.....	495 lin. ft.
Total	52,936 sq. yds.....or.....	15,517 lin. ft.

Vitrified Bricks.

First District	558 sq. yds.....or.....	270 lin. ft.
Second District	2,642 sq. yds.....or.....	1,547 lin. ft.
Third District	436 sq. yds.....or.....	945 lin. ft.
Fifth District	3,006 sq. yds.....or.....	1,106 lin. ft.
Total	6,642 sq. yds.....or.....	3,868 lin. ft.

SUMMARY OF NEW WORK.

Granite blocks	23,491 sq. yds.....or.....	12,348 lin. ft.
Granite blocks, sub..	29,572 sq. yds.....or.....	9,968 lin. ft.
	<hr/>	
Total	53,063 sq. yds.....or.....	22,316 lin. ft.
Sheet asphaltum ...	185,340 sq. yds.....or.....	53,809 lin. ft.
Sheet asphaltum, sub	52,936 sq. yds.....or.....	15,517 lin. ft.
	<hr/>	
Total	238,276 sq. yds.....or.....	69,326 lin. ft.
Vitrified bricks	34,071 sq. yds.....or.....	12,591 lin. ft.
Vitrified bricks, sub.	6,642 sq. yds.....or.....	3,868 lin. ft.
	<hr/>	
Total	40,713 sq. yds.....or.....	16,459 lin. ft.
Macadamizing	46,125 sq. yds.....or.....	23,390 lin. ft.

Total amount of new paving, 378,177 square yards, or 131,491 linear feet, equal to 24.90 miles.

REPAIRS TO PAVED STREETS.

First District	68,700 sq. yds.
Second District	145,300 sq. yds.
Third District	169,410 sq. yds.
Fourth District	127,800 sq. yds.
Fifth District	37,783 sq. yds.
Sixth District	31,450 sq. yds.
	<hr/>
Total	580,443 sq. yds.

Connections, Water and Drain Ditches Repaired.

First District	9,527 sq. yds.
Second District	9,200 sq. yds.
Third District	8,334 sq. yds.
Fourth District	15,000 sq. yds.
Fifth District	9,750 sq. yds.
Sixth District	4,325 sq. yds.
	<hr/>
Total	56,136 sq. yds.

Footway Breaks Repaired.

First District	2,431 sq. yds.
Second District	1,706 sq. yds.
Third District	8,630 sq. yds.
Fourth District	5,204 sq. yds.
Fifth District	136 sq. yds.
Sixth District	4,065 sq. yds.
Total	22,172 sq. yds.

Grading.

First District	139,711 cu. yds.
Second District	424,902 cu. yds.
Third District	34,230 cu. yds.
Fourth District	168,059 cu. yds.
Fifth District	89,477 cu. yds.
Sixth District	135,022 cu. yds.
Total	991,401 cu. yds.

New Crossing Stone.

Second District	942 lin. ft.
Third District	660 lin. ft.
Fourth District	4,581 lin. ft.
Fifth District	52 lin. ft.
Total	6,235 lin. ft.

Curbstone Reset.

First District	24,371 lin. ft.
Second District	38,481 lin. ft.
Third District	17,268 lin. ft.
Fourth District	20,024 lin. ft.
Fifth District	9,685 lin. ft.
Sixth District	5,134 lin. ft.
Total	114,963 lin. ft.

New Curbstone Set.

First District	68,522 lin. ft.
Second District	26,580 lin. ft.
Third District	7,886 lin. ft.
Fourth District	15,113 lin. ft.
Fifth District	14,598 lin. ft.
Sixth District	15,518 lin. ft.
Total	148,217 lin. ft.

Wooden Trunks.

First District	350 lin. ft.
Second District	17 lin. ft.
Fourth District	1,021 lin. ft.
Fifth District	1,649 lin. ft.
Sixth District	2,638 lin. ft.
Total	<u>5,675 lin. ft.</u>

New Footway Paving.

First District	7,246 sq. yds.
Second District	25,653 sq. yds.
Third District	2,313 sq. yds.
Fourth District	19,419 sq. yds.
Fifth District	22,006 sq. yds.
Sixth District	2,748 sq. yds.
Total	<u>79,385 sq. yds.</u>

Hand Railings.

First District	587 lin. ft.
Third District	610 lin. ft.
Fourth District	476 lin. ft.
Fifth District	2,797 lin. ft.
Sixth District	474 lin. ft.
Total	<u>4,944 lin. ft.</u>

Footway, Curb, Railway and Drainage Notices Served.

First District	5,126
Second District	7,085
Third District	3,103
Fourth District	8,139
Fifth District	1,036
Sixth District	1,245
Total	<u>25,734</u>

Brick and Stone Drains.

First District	35 lin. ft.
Third District	122 lin. ft.
Fifth District	410 lin. ft.
Sixth District	360 lin. ft.
Total	<u>927 lin. ft.</u>

Vitrified Brick and Stone Gutters Constructed on Macadamized Roads.

Fifth District	9,850 lin. ft.
Sixth District	1,630 lin. ft.
Total	11,480 lin. ft.

Curved Curb Corners.

First District	3,975 lin. ft.
Second District	2,263 lin. ft.
Third District	1,246 lin. ft.
Fourth District	1,505 lin. ft.
Fifth District	776 lin. ft.
Sixth District	775 lin. ft.
Total	10,540 lin. ft.

Resurfacing, Sheet Asphalt.

First District	7,463 sq. yds.....or.....	2,840 lin. ft.
Fourth District	1,316 sq. yds.....or.....	329 lin. ft.
Total	8,779 sq. yds.....or.....	3,169 lin. ft.

Resurfacing with Broken Stone.

First District	20,623 sq. yds.....or.....	10,370 lin. ft.
Second District	702 sq. yds.....or.....	400 lin. ft.
Third District	7,277 sq. yds.....or.....	3,100 lin. ft.
Fourth District	7,776 sq. yds.....or.....	6,437 lin. ft.
Fifth District	61,921 sq. yds.....or.....	30,229 lin. ft.
Sixth District	23,914 sq. yds.....or.....	12,004 lin. ft.
Total	122,213 sq. yds.....or.....	62,540 lin. ft.

*Asphalt Filled Manhole Covers Placed in Streets
Repaired by this Bureau.*

First District	31
Second District	2
Third District	32
Fourth District	34
Fifth District	2
Total	101

NEW PAVING BY PASSENGER RAILWAY COMPANIES SUBSTITUTING IMPROVED PAVEMENT FOR OTHER PAVEMENT BETWEEN TRACKS.

Granite Blocks.

First District	7,200 sq. yds.....or.....	10,800 lin. ft.
Second District	33,028 sq. yds.....or.....	52,891 lin. ft.
Total	40,228 sq. yds.....or.....	63,691 lin. ft.

RESURFACING WITH SHEET ASPHALT BY PASSENGER RAILWAY COMPANIES.

First District	17,722 sq. yds.....or.....	13,600 lin. ft.
Second District	51,598 sq. yds.....or.....	23,137 lin. ft.
Third District	40,481 sq. yds.....or.....	14,857 lin. ft.
Total	109,801 sq. yds.....or.....	51,594 lin. ft.

BY PASSENGER RAILWAY COMPANIES.

Old Granite Blocks Relaid.

First District	82,611 sq. yds.....or.....	25,217 lin. ft.
Second District	163,420 sq. yds.....or.....	71,149 lin. ft.
Third District	76,494 sq. yds.....or.....	15,118 lin. ft.
Fourth District	6,600 sq. yds.....or.....	1,650 lin. ft.
Total	329,125 sq. yds.....or.....	113,136 lin. ft.

Old Vitrified Bricks Relaid.

First District	4,322 sq. yds.....or.....	3,717 lin. ft.
Second District	5,593 sq. yds.....or.....	1,859 lin. ft.
Total	9,915 sq. yds.....or.....	5,576 lin. ft.

Average Cost of New Paving.

	1903.	1904.	1905.
	Cost per square yard.	Cost per square yard.	Cost per square yard.
Granite Blocks on Concrete Base	\$3.38	\$3.08	\$2.92
Sheet Asphalt on { Trinidad Lake	2.18	2.18	
Concrete Base. { Refined Natural		1.92	1.65
Vitrified Bricks on Concrete Base	2.23	2.33	1.86

CITY OF PHILADELPHIA.

Classification of Pavements, December 31, 1905.

	Cobble and Rubble	Granite Blocks.	Vitrified Bricks.	ASPHALT.		Macadam.	Granolithic.	Slag Blocks.	Total Miles.
				Sheet.	Block.				
Miles	61.40	378.60	145.71	800.69	19	273.34	12.77	9.82	1,261.83
Percentage.....	4.86	30.02	11.55	28.60	1.51	21.67	1.01	.78	
							Less turnpikes.....		4.25
							Total maintained by City.....		1,257.08

288

Total length of streets and roads opened and in use..... 1,730.33
 Paved..... 1,261.33
 Unpaved..... 469

Classification of Sidewalks.

Brick.	Brick and Stone Combined.	Stone.	Cement.	Asphalt.	Wood.	Total Miles.
1.154	30	170	576	1	6	1,987

Name of street, location of work, and character of pavement of all streets paved and repaved by the City, and new macadam work.

NEW PAVING, 1905.

Refined Natural Asphalt.

Alder street from Moyamensing avenue to Porter street.
 Addison street from Fifty-third street to Fifty-fourth street.
 Baltimore avenue from Fifty-second street to Fifty-third street.
 Colwyn street from York road to Broad street.
 Cumberland street from Twenty-second street to Twenty-fourth street.
 Columbia avenue from Fifty-second street to Parkside avenue.
 Coral street from Ontario street to Westmoreland street.
 DeLancey street from Fifty-second street to Fifty-fourth street.
 DeLancey street from Sixtieth street to Sixty-first street.
 Dauphin street from Glenwood avenue to Sedgley avenue.
 Ella street from Venango street to Tioga street.
 Eighth street from Ritner street to Porter street.
 Eleventh street from Moyamensing avenue to Porter street.
 Edgewood street from Market street to Arch street.
 Fifty-third street from Sansom street to Walnut street.
 Felton street from Arch street to Race street.
 Fifty-third street from Chestnut street to Sansom street.
 Fifty-first street from Walnut street to Lombard street.
 Forty-sixth street from Spruce street to Pine street.
 Fifty-ninth street from Media street to Lansdowne avenue.
 Fiftieth street from Market street to Sansom street.
 Girard avenue from Sixty-third street to Sixty-fourth street.
 Gratz street from Wingohocking street to Courtland street.
 Hagert street from Twenty-third street to Twenty-fourth street.
 Hobart street from Thompson street to Master street.
 Howard street from Allegheny avenue to Westmoreland street.
 Irving street from Fifty-first street to Fifty-second street.
 Larchwood street from Forty-ninth street to Fifty-second street.
 Media street from Forty-ninth street to Sixty-first street.
 Melon street from Lex street to Forty-fifth street.
 Marvine street from Venango street to Erie avenue.
 Millick street from Market street to Arch street.
 Media street from Fifty-sixth street to Fifty-eighth street.

Osage avenue from Fiftieth street to Fifty-first street.
 Osage avenue from Fifty-third street to Fifty-fourth street.
 Pine street from Fifty-fourth street to Fifty-fifth street.
 Pine street from Fifty-third street to Fifty-fourth street.
 Plum street from Hedge street to Mulberry street.
 Pulaski avenue from Hunting Park avenue to Ruffner street.
 Reese street from Luzerne street to Lycoming street.
 Ritter street from Harold street to Moyer street.
 Redfield street from Filbert street to Arch street.
 Redfield street from Arch street to Race street.
 Saybrook avenue from Sixty-ninth street to 326 feet south-
 westward.
 Sixth street from Lycoming street to Hunting Park avenue.
 Sterner street from Twenty-fifth street to Twenty-sixth street.
 Sixty-first street from the B. & O. R. R. to Kingessing avenue.
 St. Paul street from Germantown avenue to Seventeenth street.
 Sansom street from Fifty-first street to Fifty-second street.
 Spruce street from Forty-sixth street to Sixtieth street.
 Stiles street from 232 feet east of Fifty-fourth street to Fifty-
 third street.
 South street from Sixty-first street to Sixty-second street.
 Silver street from Twenty-fifth street to Twenty-sixth street.
 Thayer street from Kensington avenue to Jasper street.
 Thompson street from Fifty-eighth street to Fifty-ninth street.
 Tenth street from Moyamensing avenue to Porter street.
 Third street from Westmoreland street to Ontario street.
 Twenty-first street from Indiana street to Allegheny avenue.
 Twenty-third street from Sedgley avenue to Firth street.
 Tackawanna street from Church street to Womrath street.
 Thirtieth street from Wharton street to Oakford street.
 Warnock street from Moyamensing avenue to Porter street.
 Wanamaker street from Thompson street to Master street.
 Whitby avenue from Fifty-eighth street to Fifty-ninth street.
 Watts street from Washington avenue to a point about thirty
 feet north.

Granite Blocks.

Auburn street from Aramingo avenue to Tulip street.
 Agate street from Allegheny avenue to Ann street.
 Chatham street from Westmoreland street to Madison street.
 Clementine street from Cedar street to Miller street.
 Cedar street from William street to Ann street.
 Commissioner street from Gaul street to Belgrade street.
 Chatham street from Ann street to William street.
 Cambria street from Aramingo street to Cedar street.

Crawford street from Scott's lane to Cresson street.
 Church street from Second street westward.
 Elkhart street from Gaul street to Miller street.
 Janney street from Clearfield street to Allegheny avenue.
 Livingston street from Neff street to Ann street.
 Lawnton street from Leverington street to Dupont street.
 Miller street from Somerset street to William street.
 Memphis street from Auburn street to Allegheny avenue.
 Rush street from Trenton avenue to Tulip street.
 Witte street from Clearfield street to Allegheny avenue.

Vitrified Bricks.

Bancroft street from Wingohocking street to Blavis street.
 Chadwick street from Wingohocking street to Blavis street.
 Fifty-eighth street from Thomas avenue to Whitby avenue.
 Granite street from Melrose street to Milnor street.
 Goodman street from Roy street to Westmoreland street.
 Hansberry street from Laurens street to Wissahickon street.
 Krams avenue from Fleming street to Mitchell street.
 Leonard street from Foust street to VanKirk street.
 Mt. Airy avenue from Germantown avenue to Mower street.
 Milnor street from Granite street to Bridge street.
 Mildred street from Moyamensing avenue to Ritner street.
 McClellan street from Twenty-first street to Twenty-second street.
 Pierce street from Twenty-second street to Point Breeze avenue.
 Romain street from Adams street to Deal street.
 Roseberry street from Seventeenth street to Eighteenth street.
 Sixty-seventh street from Woodland avenue to the P. B. & W. R. R.
 Wakeling street from Hawthorne street to Willow street.
 Watts street from Snyder avenue to McKean street.

REPAVING, 1905.

Refined Natural Asphalt.

Brown street from Nineteenth street to Corinthian avenue.
 Budd street from Aspen street north to dead end.
 Boston avenue from Memphis street to Gaul street.
 Brown street from Fortieth street to Holly street.
 Chestnut street from Forty-sixth street to Forty-eighth street.
 Edgemont street from Buckius street to Ash street.
 Filbert street from Fortieth street to Forty-first street.

- Forty-sixth street from Market street to Sansom street.
 Forty-second street from Haverford avenue to Lancaster avenue.
 Holly street from Westminster avenue to Parrish street.
 Harold street from Cedar street to Memphis street.
 Ingersoll street from Nineteenth street to Ridge avenue.
 Melon street from Sixteenth street to Seventeenth street.
 Markoe street from Parrish street to Lancaster avenue.
 Mountain street from Second street to Moyamensing avenue.
 Mt. Vernon street from Thirty-third street to Thirty-fourth street.
 Mt. Vernon street from Thirty-fifth street to Thirty-sixth street.
 Melon street from Thirty-fifth street to Thirty-sixth street.
 McKean street from Tenth street to Thirteenth street.
 Oakdale street from Memphis street to Trenton avenue.
 Perkiomen street from Vineyard street to Nineteenth street.
 Pearl street from Thirty-eighth street to Saunders street.
 Pemberton street from Fifteenth street to Rosewood street.
 Sharswood street from Ridge avenue to Twenty-fourth street.
 Seybert street from Sixteenth street to Seventeenth street.
 Tucker street from Cedar street to Memphis street.
 Warren street from Thirty-seventh street to Thirty-eighth street.
 Walnut street from Forty-fifth street to Forty-sixth street.
 Webster street from Thirteenth street to Broad street.

Granite Blocks.

- Auburn street from Thompson street to Gaul street.
 Auburn street from Trenton street to Tulip street.
 Bodine street from Norris street to York street.
 Bodine street from Susquehanna avenue to Dauphin street.
 Boston avenue from Edgemont street to Salmon street.
 Bainbridge street from Water street to Delaware avenue.
 Clementine street from Richmond street to Thompson street.
 Chatham street from Allegheny avenue to Madison street.
 Cambria street from Kensington avenue to "B" street.
 Columbia avenue from Frankford avenue to Front street.
 Camac street from Morris street to dead end north of Tasker street.
 Janney street from Auburn street to William street.
 Livingston street from Somerset street to Auburn street.
 Lombard street from Front street to Delaware avenue.
 Miller street from Allegheny avenue to Westmoreland street.

Monmouth street from Thompson street to Salmon street.
 Madison street from Thompson street to Chatham street.
 Norfolk street from Front street to Swanson street.
 Queen lane from Ridge avenue to a point 300 feet eastward.
 Salmon street from Cumberland street to York street.
 Susquehanna avenue from Franklin street to Eighth street.
 Trenton avenue from Somerset street to Cambria street.
 Thompson street from Westmoreland street to Allegheny avenue.
 Weikel street from Auburn street to William street.
 Wharton street from Thirty-first street to Thirty-third street.

Vitrified Bricks.

Armat street from Germantown avenue to Lena street.
 Heston street from Fifty-second street to Wilton street.
 Mansion street from Levering street to Gay street.

Macadamizing.

Creshem road from Allen's lane to a point 350 feet north.
 Jackson street from Naple street to Hartel street.
 Margie street from Glenwood avenue to Sedgley avenue.
 Montague street from Rhawn street to Mill street.
 Price street from Stenton avenue to Crittenden street.
 Rex avenue from Thirtieth street to Park line.
 Red Lion road from the present macadam to west of Bustleton pike.
 Stenton avenue from the end of present surfacing to Washington lane.
 Sedgwick avenue from Germantown avenue to Chew street.
 Sedgley avenue from "K" street to "L" street.
 Torresdale avenue from Cottman street to Rhawn street.
 Upsal street from Wayne avenue to Wissahickon avenue.

Re-macadamizing.

State road from Robbins street to Bridge street.

REPAVING TRAMWAY STREETS.

Vitrified Bricks.

Bodine street from Christian street to Montrose street.
 Bonsall street from Locust street to Chancellor street.
 Chancellor street from Twenty-fourth street to Bonsall street.
 Fawn street from Susquehanna avenue to Dauphin street.
 Fulton street west from Sixth street to dead end.

Harmer street from Fifteenth street to Sixteenth street.
 Hall street west from Fifth street to dead end.
 Jessup street from Locust street to dead end.
 Leithgow street north from Walnut street.
 Manning street from Twenty-third street to Twenty-fourth street.

PAVING, REFINED NATURAL ASPHALT.

Private Contracts, 1905.

Alden street from Girard avenue to Thompson street.
 Beechwood street from Mifflin street to McKean street.
 Croskey street from Mifflin street to McKean street.
 Conestoga street from Market street to Ludlow street.
 Christian street from Fifty-fourth street to Fifty-fifth street.
 Frazier street from Thompson street to Master street.
 Frazier street from Girard avenue to Thompson street.
 Frazier street from Wyalusing avenue to Girard avenue.
 Fifty-fourth street from Christian street to Catharine street.
 Glenmore avenue from Fifty-third street to Fifty-fourth street.
 Hemberger street from Mifflin street to McKean street.
 Irving street from Fiftieth street to Fifty-first street.
 Joyce street from Willard street to Westmoreland street.
 Keim street from Ontario street to Tioga street.
 Ludlow street from Fiftieth street to Fifty-first street.
 Malcolm street from Fifty-seventh street to Fifty-eighth street.
 McKean street from Twenty-first street to Twenty-third street.
 Norfolk street from Fifty-fourth street to Fifty-fifth street.
 Norwood street from Mifflin street to McKean street.
 Ninth street from Ritner street to Porter street.
 Ogden street from Fiftieth street to Fifty-first street.
 Paxon street from Viola street to Parkside avenue.
 Peach street from Chester avenue to Springfield street.
 Reedland street from Sixty-second street to Sixty-third street.
 Russel street from Thirteenth street to Park avenue.
 Seventh street from Allegheny avenue to Glenwood avenue.
 Siegel street from Twenty-first street to Twenty-second street.
 Sixty-first street from Market street to Arch street.
 Sansom street from Fifty-eighth street to Fifty-ninth street.
 Sickels street from Market street to Ludlow street.
 Twenty-first street from Siegel street to McKean street.
 Titan street from Thirtieth street to Thirty-first street.
 Wishart street from "D" street to Rorer street.
 Webster street from Fifty-third street to Fifty-fourth street.

PAVING, VITRIFIED BRICKS.

Private Contracts, 1905.

Custer street from Clearfield street to Allegheny avenue.
Hutchinson street from Ritner street to Porter street.
Marshall street from Ritner street to Porter street.
Marion street from Manheim street to Ashmead street.
Newhall street from Apsley street to Wyoming street.
Percy street from Ritner street to Porter street.
Paxon street from Greenway avenue to Kingsessing avenue.
Reinhardt street from Sixty-first street to Sixty-second street.
Sheridan street from Ritner street to Porter street.
Wheeler street from Sixty-second street to Sixty-third street.

ANNUAL REPORT
OF THE
BOARD OF HIGHWAY SUPERVISORS
FOR THE YEAR 1905

BOARD OF HIGHWAY SUPERVISORS

President,

A. LINCOLN ACKER.

Director, Department of Public Works.

JERRY A. HUNTER, Bureau of Highways.

FRANK L. HAND, Bureau of Water.

ALFRED S. EISENHOWER, Bureau of City Property.

JOHN C. SAGER, Electrical Bureau.

GEORGE S. WEBSTER, Bureau of Surveys.

Secretary,

MALCOLM M. COPPUCK.

Clerk,

THOMAS A. DUNN.

Chief Draughtsman,

WM. M. McFADDEN.

Draughtsmen,

FREDERICK WHITE,

EDWARD J. DAUNER,

M. M. STRINGFIELD,

JOHN H. BROOMALL,

WILLIAM K. RANDOLPH,

HENRY D. HOSBACH,

ARTHUR E. BUCHHOLZ,

J. MILTON RITCHIE,

H. OSCAR SMITH,

J. EDWARD ZAUN.

ANNUAL REPORT
OF THE
BOARD OF HIGHWAY SUPERVISORS
FOR THE YEAR 1905

Philadelphia, January 1, 1906.

A. LINCOLN ACKER, Esq.,
Director, Department of Public Works.

DEAR SIR:—Herewith please find the annual report of the Board of Highway Supervisors for the year 1905.

The revenue from the work in the Draughting Department was thirty-one thousand one hundred and ten (31,110) dollars and twenty-four (24) cents, and the expenditures were ten thousand five hundred and ninety-three (10,593) dollars and sixty-eight (68) cents, showing an excess of receipts over expenditures of twenty thousand five hundred and sixteen (20,516) dollars and fifty-six (56) cents.

One hundred and forty-three (143) plans have been added to our records during the year, but with the present force of draughtsmen, the work accumulates faster than it can be plotted. A reference to the fact that the electric companies have double the number of draughtsmen to do for each individual company what our draughtsmen are expected to do for all of them, besides details being obliged at times to go to widely separated portions of the City to make measurements and obtain data for the plans, shows the difficulty under which our draughtsmen have to labor in their efforts to keep up with the work.

I would respectfully ask consideration of the report of the Chief Draughtsman, Mr. Wm. McFadden, and desire to testify to his very able discharge of the duties of his position.

I would also ask an inspection of the Draughting Department that a comprehensive understanding may be had of the wide extent and completeness of our plans and records.

Very truly,

MALCOLM M. COPPUCK,

Secretary.

REPORT OF CHIEF DRAUGHTSMAN

Philadelphia, January 20, 1906.

A. LINCOLN ACKER, Esq.,
President, Board of Highway Supervisors.

DEAR SIR:—I herewith respectfully submit the annual report of the draughting room of the Board for the year ending December 31, 1905.

The appropriation made to this office for the year 1905 was \$11,120, of which amount \$10,593.68 was expended, \$472.17 transferred and \$54.13 merged.

The earnings for the year were \$34,928.30, and the amount outstanding from previous years was \$4422.84, which make \$39,351.14 to be accounted for. Our receipts were \$31,110.24, leaving a sum of \$8,240.90 yet to be received. The net receipts were \$20,516.56 in excess of the expenditures.

During the year one hundred and forty three plans of substructures have been added, being equal to about twenty-eight miles, and making a total of three hundred and forty-five miles of finished plans on file.

The several companies herein named have laid approximately the following amount of conduit during the year:

- Bell Telephone Company, seventy-four miles.
- Keystone Telephone Company, thirty-eight miles.
- Philadelphia Rapid Transit Company, four miles.
- Philadelphia Electric Company, eight miles.
- Pneumatic Transit Company, three miles.

The United Gas Improvement Company laid three miles of pipe over ten inches in diameter, and thirty-three miles of smaller pipe.

The following list will show for whom work was done and the amounts charged against each :

Bell Telephone Company	\$20,736 50
Keystone Telephone Company	8,361 10
United Gas Improvement Company	2,182 28
Philadelphia Electric Company	1,704 78
Philadelphia Rapid Transit Company	1,134 11
Pneumatic Transit Company	469 13
Julius Cold Storage & Refrigerating Co.....	185 25
Edison Electric Light Company	79 50
Pennsylvania Heat, Light & Power Co.....	24 75
Delaware Freezing Company	17 50
Philadelphia & Reading Railway Co.....	13 40
John Wanamaker	10 00
Pennsylvania Railroad Company	5 00
Women's Pennsylvania Society for Prevention of Cruelty to Animals	5 00
Grand total	\$34,928 30

Concluding, I wish to thank the Members of the Board and the Secretary for their kind assistance given me in the performance of my duties in this office.

Respectfully submitted,

WM. M. McFADDEN,
Chief Draughtsman.

ANNUAL REPORT

OF THE

BUREAU OF SURVEYS

FOR THE

YEAR ENDING DECEMBER 31, 1905

Department of Public Works

BUREAU OF SURVEYS

OFFICERS, 1905



Chief Engineer,

GEORGE S. WEBSTER.

Principal Assistant Engineer.

GEORGE E. DATESMAN.

Chief and Recording Clerk—Joseph R. Scott.

Sewer Registrar—William Calvert.

Assistant Recording Clerk—Robert McFadden.

District Surveyors and Regulators.

1st—John M. Nobre.

8th—C. A. Sundstrom.

2nd—C. W. Close.

9th—Joseph C. Wagner.

3rd—Wm. C. Cranmer.

10th—John H. Webster, Jr.

4th—Fritz Bloch.

11th—Joseph Johnson.

5th—Walter Brinton.

12th—J. Harvey Gillingham.

6th—Joseph Mercer.

13th—H. M. Fuller.

7th—William K. Carlile.

14th—Clement B. Webster.

ENGINEERING DIVISION

SEWERS (Construction).

Assistant Engineer—Charles H. Ott.

Sewer Clerk—Robert M. Downing.

BRIDGES.

Assistant Engineer—Henry H. Quimby.

Chief Draughtsman—James W. Phillips.

SEWERS (Plans).

Assistant Engineer—Charles Frommer.

Chief Draughtsman—Charles Jacobsen.

DELAWARE AVENUE IMPROVEMENT.

IMPROVEMENT OF RIVER CHANNELS.

Assistant Engineer—Norman L. Stamm.

GENERAL PLANS.

Assistant Engineer—Benjamin A. Haldeman.

Chief Draughtsman—Edwin M. Evans.

SPECIAL CORPS.

Assistant Engineer—N. J. Witmer.

TESTING LABORATORY.

Assistant Engineer—W. P. Taylor.

REGISTRY DIVISION

Registrar—John W. Frazier.

Registry Clerk—James H. Roberts.

Search Clerk—Charles W. Wagner.

ANNUAL REPORT
OF THE
BUREAU OF SURVEYS
FOR THE YEAR 1905

A. LINCOLN ACKER., ESQ.,
Director, Department of Public Works.

DEAR SIR:—The annual report of the operations of the Bureau of Surveys for the year ending December 31, 1905, is respectfully submitted:

The appropriations and expenditures were as follows:

Appropriation for 1905	\$506,660	00
Balance available from former years	2,763,609	75
Additional appropriations and transfers	816,913	81
Expenditures	\$1,354,893	20
Balance available in 1906	2,626,686	00
Balance merged	4,433	54
Transfers from	101,170	82
	\$4,087,183	56
	\$4,087,183	56

The receipts were:

In general office	\$34,147	40
In registry division	1,538	40
Total receipts, District Surveyors	114,194	44
	\$149,880	24

Board of Surveyors and Regulators.

During the year, 21 stated meetings for the transaction of general business were held by the Board. Seven special meetings were also held which were made necessary by visits to localities affected by proposed changes in the City plan and by pressure of important business. Road Day hearings were held at four of these meetings, in January, April, July and October, when the Board heard testimony for and against contemplated changes of plans. This testimony was duly spread upon the minutes of the Board. In all 225 plans were so heard; a very great increase over that of previous years, resulting largely from the passage of ordinance of Feb. 13, 1905, which directed the placing on the City plan of a large number of streets, thirty feet or less in width, and which were already built upon. The Board confirmed 147 plans and two were rejected. Thirty-nine plans submitted by passenger railway companies, showing extension of tracks, relocation of curves and tracks, changes of rail, etc., were approved. Five hundred and seventy-four ordinances and petitions for the construction of main and branch sewers, the placing of new streets upon the plan, the striking from the plan and vacating of streets, establishment of lines and grades, revisions, etc., were received by the Board and reports submitted to Councils. The Board approved 131 deeds of dedication and releases of property owners for the beds of streets about to be placed upon the City plan or releasing rights for damages caused by revision of lines and grades.

Work amounting to \$144,925.27 was performed for the various departments and bureaus of the City; the combined cash receipts and credits for work of this character and for work done for private individuals and contractors being \$76,988.56 in excess of the total expenses of the Survey Districts.

These figures indicate that there is no falling off from year to year of the amount and value of the work performed, also a substantial increase in fees, which go to swell the City's income.

Each year the work in the district offices becomes more exacting. The increase in the volume of work in the central office, and the standardizing of all classes of municipal improvements, involves more minute examination of work, and more detail in the preparation of plans for improvements for the various bureaus and in the preservation of records.

At the meetings of the Board, aside from the performance of routine and special work, the discussion of pertinent questions serves to unify the methods of management and the service to the public in the different districts of the City.

Commission to Establish the Boundary Line Between Philadelphia and Delaware Counties.

The Commission appointed to re-establish the boundary line between Philadelphia and Delaware Counties, in the vicinity of Cobb's creek, while it filed its plans and made its final report to the Courts of Delaware and Philadelphia Counties in 1904, it was not until January 9, 1905, that the report was approved by the Court of Quarter Sessions of the Peace, of Delaware County, and by the Court of Quarter Sessions of Philadelphia County, on January 20, 1905.

Aside from the re-establishment of the boundary line and the marking of the same with permanent markers, the Commission recommended to the Assembly of the State of Pennsylvania legislation relative to powers of Boundary Line Commissions.

As a result, there was passed and approved April 14, 1905 (see p. 157, Laws of Penna. for 1905), an Act "to

provide for the running, relocating, changing, fixing, and marking of county lines.”

Main Sewers.

The appropriation for main sewers was limited to two important works properly classed as maintenance, namely, for reconstruction and relief of the Cohocksink sewer, \$50,000 and for repairs and improvement of old sewers \$15,000, authorized by ordinance of December 31, 1904.

The item of \$50,000 was later increased to \$58,000 by an additional appropriation by an ordinance of May 9, 1905.

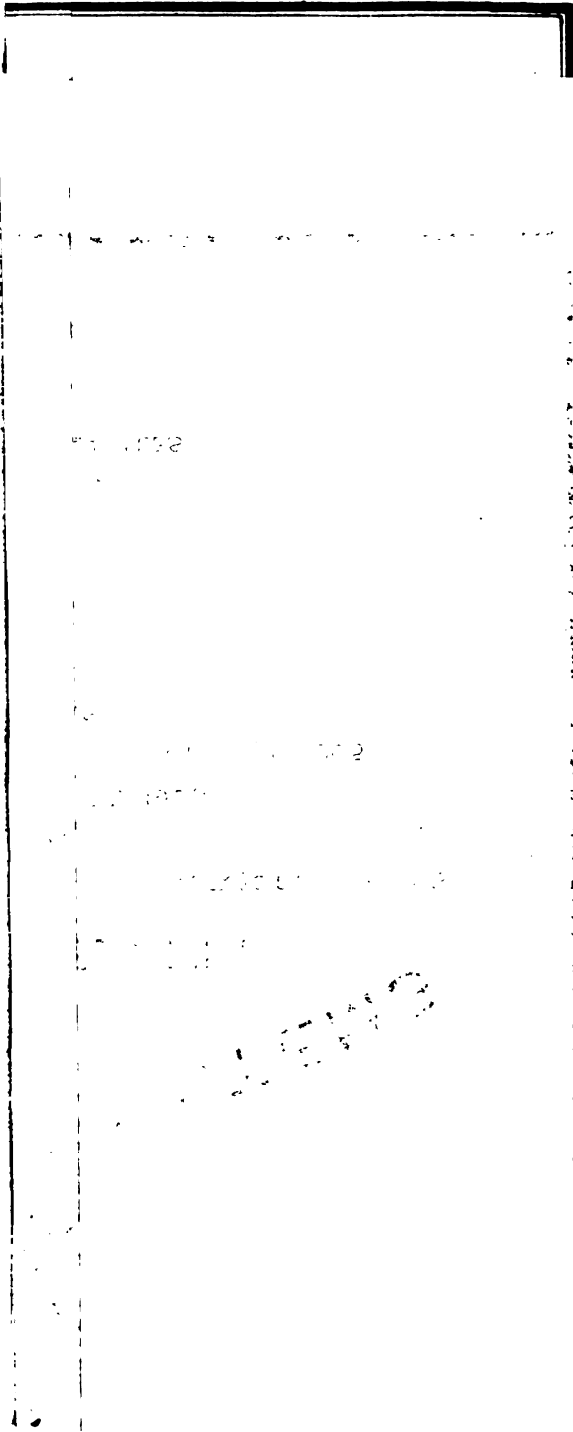
The granting of an appropriation of \$700,000 in July 1904, for the purpose of constructing main sewers, was no doubt the cause of the small appropriation for the current year.

All of the main sewers authorized had been placed under contract, with the exception of the one on Ogontz avenue, held under advisement, but placed under contract in November, 1905, and on Pratt street and Magee street, re-advertised, and with that on Girard avenue and Front street, placed under contract in January, 1905.

Under authority of an appropriation of \$100,000 for the construction of a deep sewer in Market street, plans and details of the construction were prepared.

By ordinance of August 1, 1905, this sum was transferred from the bureau, and as it was decided that the building of this sewer was accessory to the subway of Philadelphia Rapid Transit Company, the plans were utilized by that company in making its application for a permit to do the work before the Board of Highway Supervisors.

A detailed statement of work performed on main sewers authorized and placed under construction, and carried on during the current year, where the sewers are not included under other headings, is as follows:



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1870-1871



Castor road, from northeast of Harrison street to Pratt street; thence in Pratt street to Summerdale street; thence in Summerdale street to Sanger street. The following sizes and lengths were built: 409.1 feet of 6 feet diameter, 549.2 feet of 5 feet 9 inches diameter, 551.3 feet of 5 feet 3 inches diameter, 21.7 feet of 4 feet 9 inches diameter, 785.6 feet of 3 feet 9 inches diameter and 527.1 feet of 3 feet by 2 feet brick sewer; also 1196.5 feet of 18 inches diameter terra cotta pipe, 459.7 feet of 15 inches diameter terra cotta pipe sewers and three junction chambers. The contractor has been paid on account the sum of \$22,944.00. Final estimate is pending. Contractor, M. J. Hogan & Co. Inspectors, B. H. Foulkrod and Daniel Walsh.

Eastwick avenue, from Sixty-fourth street to Sixtieth street, and in Sixtieth street, from Eastwick avenue to Gibson avenue. Lengths and sizes built: 730 feet of 4 feet 6 inches diameter, and 538 feet of 3 feet 9 inches diameter sewer. Total cost of the work, \$23,029.74, of which \$9,000 was paid on account in 1904, and \$14,029.74 in 1905. Final estimate paid June 21, 1905. Contractor, Robert Higgins. Inspector, Thomas McElwee.

Indian Run sewer, branch in Lebanon avenue from Indian Run near Sixty-ninth street to east of Sixty-seventh street. Length and sizes built: 318 feet of 4 feet diameter sewer. Total cost of the work, \$12,000; of which \$7,680 was paid on account in 1904, and \$4,320 in 1905. Final estimate paid April 17, 1905. Contractor, Robert Higgins. Inspector, John Hare.

Magee street extension from west of Delaware avenue to a point near the Bulkhead line and from Milnor street westwardly to Torresdale avenue. Lengths and sizes built: 136.56 feet of 9 feet 6 inches diameter, 955 feet of 8 feet 9 inches diameter, 680 feet of 8 feet 6 inches diameter

sewer and a river outlet wall. There has been paid on account the sum of \$37,576. Work is in progress. Contractor, David Peoples. Inspector, John W. Harmer.

Rock Run sewer in Ashdale street, from the P. N. & N. Y. R. R. to Fifth street. Lengths and sizes built, 749 feet of 13 feet diameter and 601 feet of 12 feet 6 inch diameter sewer. There has been paid on account the sum of \$31,000. Work is in progress. Contractor, David McMahan. Inspector, John McCormick.

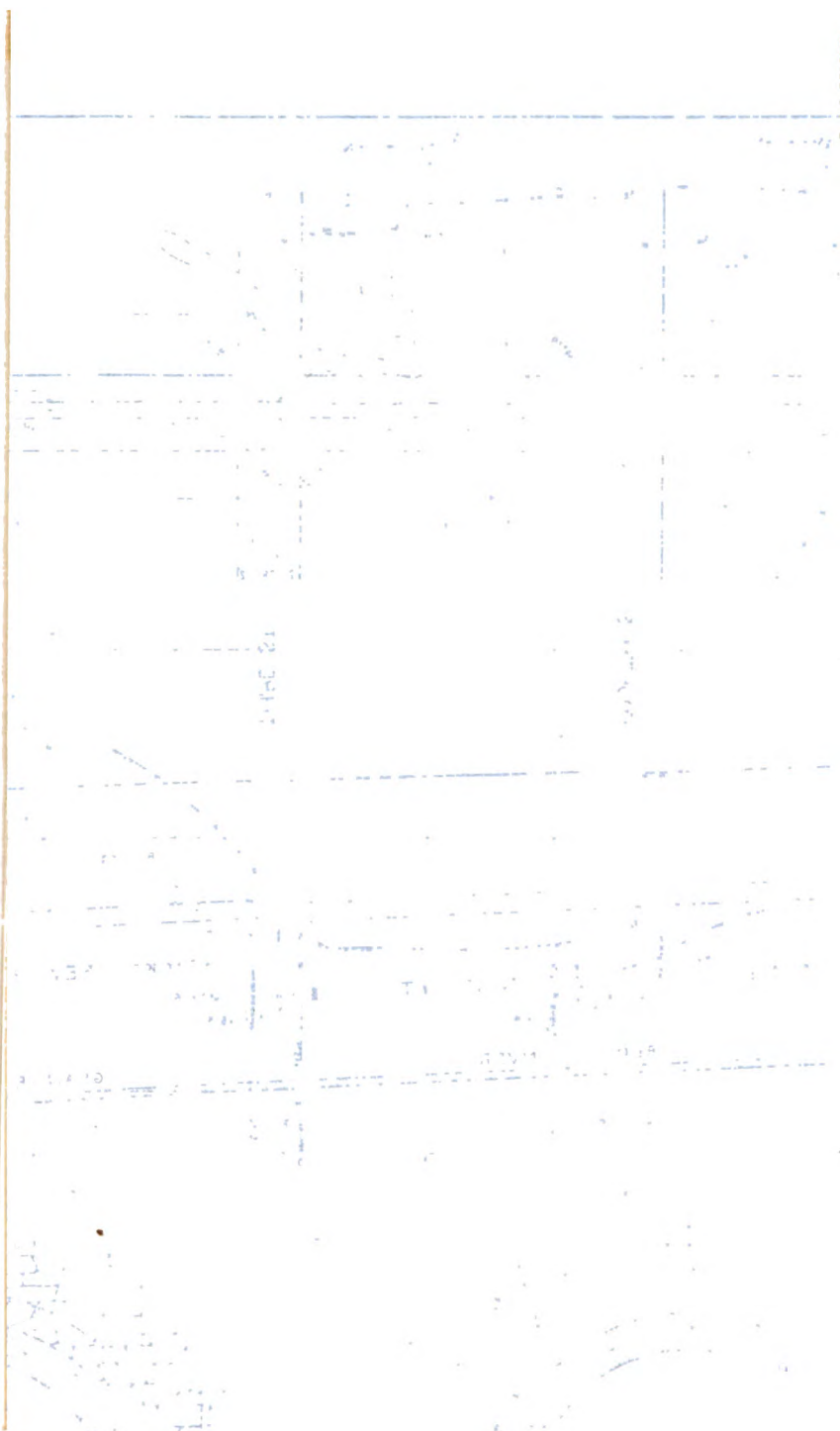
Rock Run sewer in Duncannon street, from stream near the Kensington and Oxford turnpike to "A" street, in "A" street to Fisher avenue, in Fisher avenue to Ella street and in Ella street to Tabor road. Length and size built, 1294.41 feet of 4 feet diameter sewer. Total cost of the work, \$14,059.39. Contractor, Henderson & Co., Ltd. Inspector, F. D. Morris.

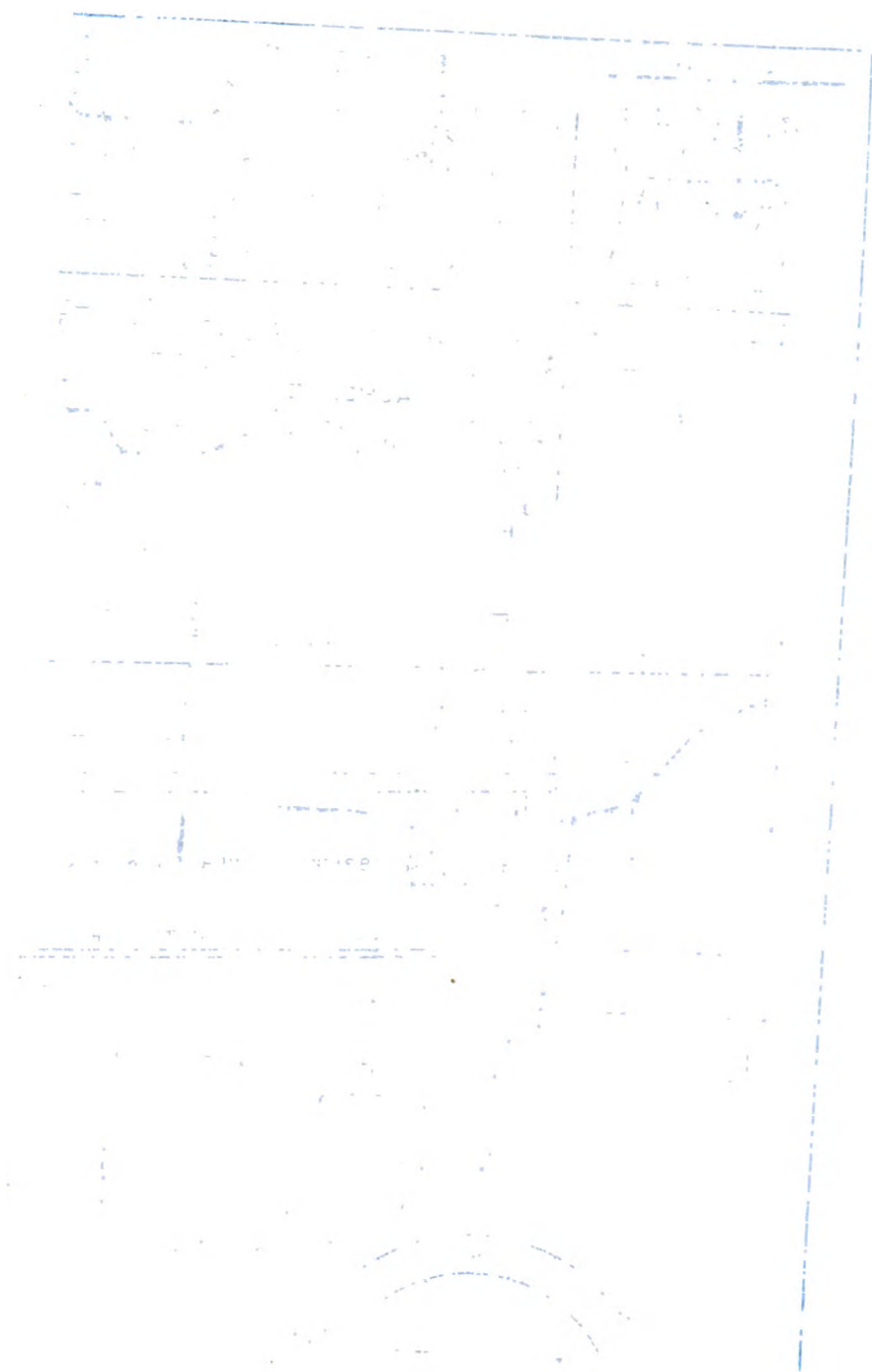
Sixtieth street, from Cobb's creek to Trinity street, in Trinity street, from Sixtieth to Fifty-ninth street, and in Fifty-ninth street, from Trinity street to Chester avenue. Length and size built: 459.47 feet of 4 feet 6 inches diameter sewer. Total cost of the work, \$17,709.54, of which \$10,184 was paid on account in 1904, and \$7,525.54 was paid in 1905. Final estimate paid March 15, 1905. Contractor, McCormick & Co. Inspector, C. E. Preston.

Twelfth street, from Lombard to Locust streets. Lengths and sizes built: 608 feet of 5 feet by 3 feet 4 inches and 467.50 feet of 4 feet by 2 feet 8 inches oval sewer. Total cost of the work, \$18,009.01, of which the contractor was paid on account the sum of \$3,328 in 1904, and \$14,681.01 in 1905. Final estimate paid June 6, 1905. Contractor, Robert Lombardi. Inspector, C. A. Crossin.

Intercepting System.

Real estate improvements, both actual and projected, in the Manayunk district and the Falls of Schuylkill make it





incumbent upon the City to provide adequate means of drainage so as not to retard this development, or in case it has been made, to avoid all possibility of polluting the water supply, by taking care to divert the drainage into the proper channels.

The Main Intercepting sewer for some years has been performing a greater duty than it was designed for. It should be relieved by carrying all the drainage from the higher levels through the ridge dividing the Schuylkill water shed from that of the Delaware river, and conducting it into the latter river. This construction, recommended by the Department, has been begun, and a considerable length of tunnel constructed during the current year, but the work must be carried on over a number of years before the ultimate object will be attained.

Important additional extensions to this system are the following:

Wissahickon High Level sewer along the Wissahickon creek, from above Hartwell avenue to Rex avenue; the Cresheim creek intercepting sewer, from Moreland avenue, north along a drainage street to Willow Grove avenue, to Twenty-fifth street, to Hartwell avenue, to stream east of Twenty-fifth street.

The pollution of inland streams through the gradual growth of real estate development and the necessity for drainage into the nearest outlet has presented a number of serious problems, the solution of which devolves upon the Department, and provision for which will rest upon Councils. The solution in each case is to provide intercepting sewers along the more important streams, to collect the drainage and discharge it into larger tidal streams away from improved property. Cobb's creek and Frankford creek afford examples.

The option to construct these intercepting sewers no longer rests with the City, as by a recent Act of Assembly

there was created a State Department of Health, with a Commissioner of Health having large powers, among other things, the power to compel any municipal government to take adequate measures to remove sewage pollution from any of the streams within its borders so polluted.

The following is a detailed report of construction carried on within the intercepting system.

Wissahickon High Level cut off sewer in Twenty-fourth street and through private property along the line of Twenty-fourth street from Indiana street to the P. G. & N. R. R. Length built, 679 feet of 6 feet diameter sewer, all of which is constructed in tunnel. The contractor has been paid on account the sum of \$18,679.68. Work is in progress. Contractor, T. H. Bowman. Inspectors, E. H. Sickels, J. J. McVeigh, Wm. Manser, Daniel Walsh.

Wingohocking Creek System.

The system is so large, comprising in addition to the main stem, three main branches, each of the dimensions of the larger main sewers, that scarcely a year passes that something is not done upon the extension of one or the other of them. Extensions are required to meet the demands of building improvement. One stem recently completed through Mt. Airy has served to open for developing a tract of more than 300 acres.

One extension, for which bids were obtained in June, 1904, was not placed under contract until November, 1905, which comprised that portion along Ogontz avenue, from Olney avenue to the drainage street, north of Chew street. The completion of this sewer will admit of some needed street improvement.

During the present year, an extension was made to the main stem of the Wingohocking creek sewer in Amnsbury street, from the terminus near Sixth street to the North

Penn railroad. This work was started during the latter part of the past year and carried to completion during the present year, under ordinance approved June 27, 1904, bids for which were received on schedule of September 7, 1904.

Also, a branch to the Wingohocking creek main sewer was constructed in Ninth street, from Courtland street to Wyoming street, to Eleventh street, to Loudon street, to Twelfth street, to Ruscumb street. This work was also authorized under ordinance approved June 27, 1904, bids for which were received on schedule of October 14, 1904. Of this sewer the lengths and sizes built were as follows: 523.9 feet of 5 feet 6 inches diameter, 426.1 feet of 5 feet diameter, 451.6 feet of 4 feet 9 inches diameter, and 980.3 feet of 4 feet 6 inches diameter sewer. There has been paid on account the sum of \$17,068.80. Final estimate is pending. Contractor, M. J. Hogan & Co. Inspector, Thomas D. Hooper.

Wingohocking creek sewer in Annsbury street, from near Sixth street to the North Pennsylvania railroad. Length and size built: 80 feet of 17 feet 3 inches diameter, special section, inverted oval sewer. Total cost of the work, \$15,040, of which the contractor was paid on account in 1904, the sum of \$4,864, and in 1905, the sum of \$10,176. Final estimate paid May 23, 1905. Contractor, David Peoples. Inspector, J. M. Hipple.

Drainage in the Southern Section of the City.

The necessity for providing houses to meet the growth of population has brought the property in the southerly section of the City, between the Delaware and Schuylkill rivers, into great demand, owing to its comparative accessibility from the business centre of the City.

The availability of this land for improvement purpose, owing to the fact that a large part of it is protected from

overflows by the river bank only, is essentially dependent upon the City providing adequate means for drainage.

Several sewer systems are under construction or projected to meet these demands, among them being the McKean street relief sewer, between Swanson street and Broad street.

To make the sewer in question effective, it should be extended from its present terminus, on Broad street, to Mifflin street, thence westward and northward to Sixteenth street and Tasker street. Councils have recently appropriated funds for this purpose.

Work upon the sewer in Porter street, from Front street to Moyamensing avenue, was carried to completion. A particularly important addition to this sewer will be the extension of the main outlet along the line of Porter street, from Front street to the Delaware river.

The work of constructing the main sewer in Jackson street, west of the Schuylkill river, was continued, but additional appropriations must be made before this system can become effective. It must be extended from Thirty-sixth street to Twenty-ninth street and northward on the latter street to Morris street.

The construction work of the year is as follows:

Jackson street, from 354 feet west of Schuylkill avenue to Thirty-sixth street. Length and size built: 841.57 feet of 7 feet 6 inches diameter sewer. Total cost of the work \$19,860.37. Final estimate paid August 17, 1905. Contractor, Sweeten & Hanlon. Inspectors, E. H. Sickels, John Barlow and John D. Henderson.

McKean street, from Twelfth street to Broad street. Lengths and sizes built: 244.83 feet of 7 feet diameter, 636.64 feet of 6 feet diameter sewer and a junction chamber. Total cost of the work, \$23,253.76, of which \$3,400 was paid on account in 1904, and \$19,853.76 in 1905.

Final estimate paid September 6, 1905. Contractor, Howard E. Ruch. Inspector, Joseph Hunter.

Shunk street sewer system, extension in Porter street, from Stone House lane to Moyamensing avenue. Lengths and sizes built: 300.82 feet of 6 feet 6 inches diameter, 76 feet of 6 feet diameter, 883.2 feet of 5 feet 6 inches diameter, 446 feet of 5 feet diameter, 446 feet of 4 feet 6 inches diameter and 458 feet of 4 feet diameter sewer. Total cost of the work, \$68,792.92, of which \$18,144 was paid on account in 1904, and \$50,648.92 consisting of \$43,450.65 in City warrants and \$7,198.27 in frontage assessment bills was paid in 1905. Final estimate paid, September 25, 1905. Contractor, David Peoples. Inspector, P. D. Brown.

Frankford Intercepting System.

The Frankford Intercepting System is one of the most comprehensive in the City, having for its object the restoration of the Frankford creek to a sanitary condition.

It comprehends first, diverting the flow of the Little Tacony creek, from the natural channel and carrying it by means of a large conduit into the Frankford creek, north of Frankford, the building of an intercepting sewer in the channel of the old creek, and constructing a wide avenue over it.

This work is intended to be followed later by the construction of a large sewer in Wheat Sheaf lane, from the Delaware river to Frankford avenue and thence along Frankford creek to its junction with the Wingohocking creek, where the sewage from Germantown would be intercepted.

An intercepting sewer to gather the drainage from existing sewers is intended then to be constructed along Frankford creek, the contents of which sewer would be discharged

into the Wheat Sheaf lane sewer aforesaid, thus allowing storm water only to find its way into Frankford creek.

Appropriations extending over a series of years are necessary to accomplish this, but considerable progress toward this end has been made during the last few years.

Work has been continued on the large sewer in Wakeling street, from Tacony street to Ditman street, and on the upper end of the system on Pratt street, Saul street and Foust street to Oakland street.

A detailed statement follows:

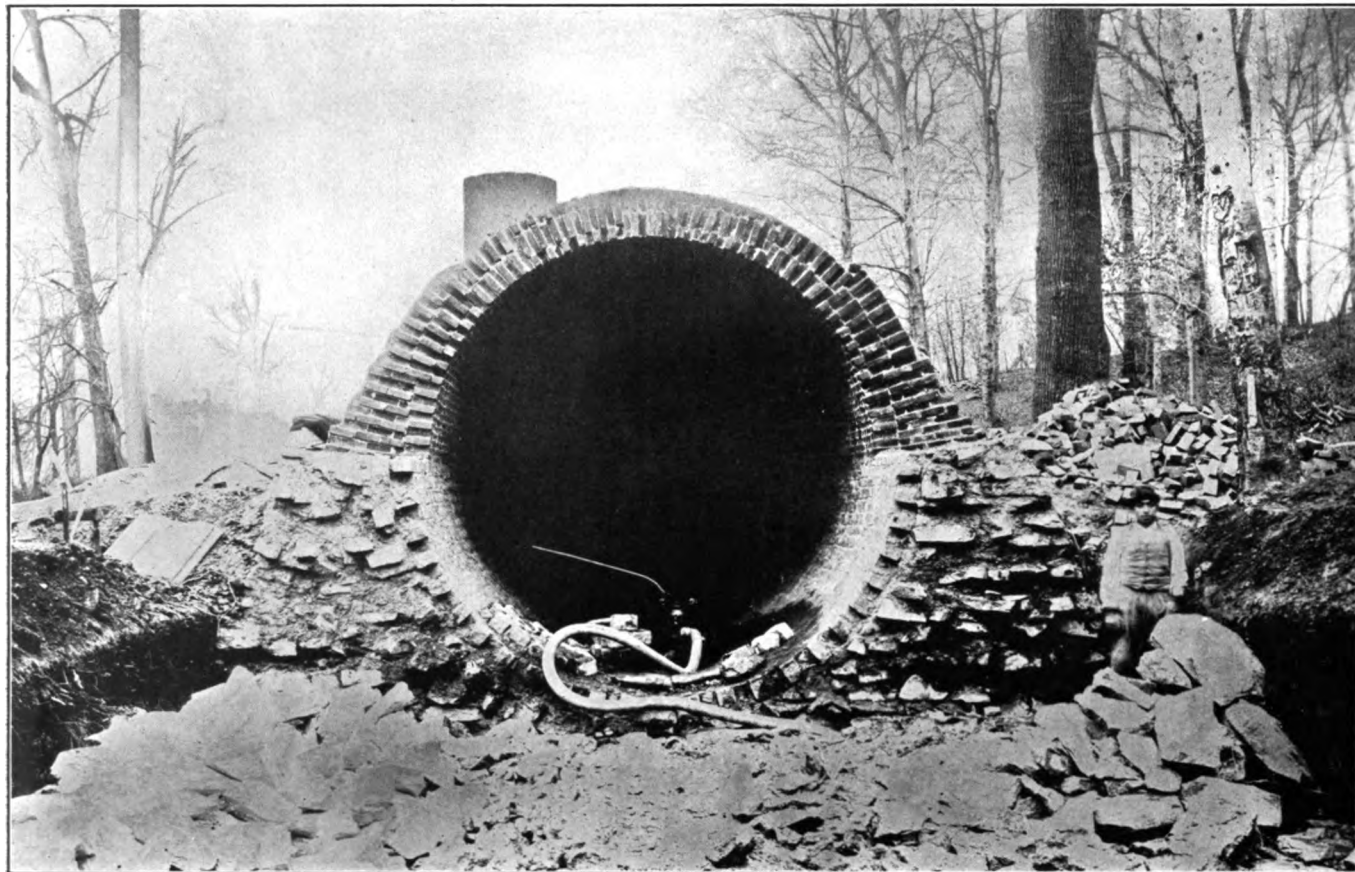
Frankford Intercepting Sewer System in Wakeling street, from north of Tacony street to Ditman street. Length and size built: 751 feet of 11 feet 6 inches by 10 feet 6 inches, rectangular section, concrete sewer with a reinforced concrete roof. The contractor has been paid on account the sum of \$27,304.80. Work is in progress. Contractor, Robert Higgins. Inspector, George W. Myers.

Pratt street sewer extension, from near Leiper street to Saul street, in Saul street to Foust street, in Foust street to Oakland street and east in Oakland street to stream. Lengths and sizes built, 164 feet of 12 feet diameter, 716 feet of 12 feet 9 inches diameter, 40 feet of 8 feet diameter sewer and a junction chamber. There has been paid on account the sum of \$26,515.20. Work is in progress. Contractor, David McMahon. Inspector, P. D. Brown.

Cohocksink System.

There was appropriated for the work of reconstructing worn out portions of the Cohocksink sewer the sum of \$50,000, which was supplemented by an additional appropriation of \$8,000 by ordinance of May 9, 1905.

The funds so provided have been expended in the total reconstruction of the sewer on Dauphin street, between Twelfth and Broad street.



SEWER SECTION AT PRATT AND SAUL STREETS 12 FEET 9 INCHES DIAMETER.

The policy of the Bureau of rebuilding entirely worn out portions of this large old sewer has resulted in the cessation of dangerous breaks. While much has been done to renew this system much remains to be done in the renewal of portions of the sewer which are in a dangerous condition.

With funds provided from the sewer loan of 1904, the portion of the sewer in Front street, from Wildey street to Girard avenue, and in Girard avenue, from Front street to Mascher street was reconstructed. The new construction consisted of side walls and invert of concrete, the latter lined with vitrified bricks, and the top of reinforced concrete.

This sewer replaced one which, having been built piecemeal, a great many years ago, was defective and inadequate in every particular.

Examinations along the line of this system show the necessity of reconstructing those portions in Montgomery avenue, from Sixth street to Randolph street, and in Randolph street, from Montgomery avenue to Columbia avenue.

There was appropriated for the repairs, reconstruction and improvement of old sewers, the sum of \$15,000, which was applied principally to reconstructing the sewer in Mascher street, northward of Thompson street.

The section of sewer used was similar in design to that in Girard avenue and Front street, known as the reinforced concrete section.

A section of the Cohocksink sewer in Thompson street, between Lawrence street and Fifth street, begun in 1904, was also completed.

A detailed statement of this work follows:

Cohocksink sewer relief and reconstruction in Girard avenue, from Mascher street to Front street and in Front street, from Girard avenue to a point near Wildey street.

The following sizes and lengths were constructed, 41.95 feet of 8 feet 3 inches diameter brick sewer, 694.05 feet of rectangular section concrete sewer, 10 feet by 6 feet 6 inches in dimensions, with a reinforced concrete roof, and 64 feet of special section sewer with reinforced concrete roof. Total cost of the work \$35,127.17. Final estimate paid December 29, 1905. Contractor, J. H. Loucheim. Inspectors, Thomas MacElwee and W. E. Haley.

Cohocksink sewer reconstruction and relief in Montgomery avenue, from the east side of Marshall street to 24 feet east of Ninth street. With the exception of the repaving, all of the work upon this contract was completed in 1904. Total cost of the work, \$49,895.02, of which \$33,850.58 was paid on account in 1904 and \$16,044.44 in 1905. Final estimate paid, January 24, 1905. Contractor, Robert Higgins. Inspector, John Vicary.

Cohocksink sewer reconstruction and relief in Dauphin street, from Twelfth to Broad street. Length and size built: 647 feet of 13 feet diameter sewer. There has been paid to the contractor on account the sum of \$32,319.06. Work is in progress. Contractor, J. H. Loucheim. Inspector, John Vicary.

Repairs, reconstruction and improvement of old sewers, etc., under the general contract for 1904. The work done under this contract during 1905 consisted in the reconstruction of the Cohocksink sewer in Thompson street at Lawrence street where a break occurred on November 14, 1904. The cost of the work at this location was \$4859.07, which covered the reconstruction of 110.7 linear feet of 11 feet diameter sewer. The total expenditures under this contract for the years 1904 and 1905 was \$18,114.88, of which \$10,501.36 was paid on account in 1904 and \$7613.52 was paid in 1905. Final estimate paid September 6, 1905. Contractor, J. H. Loucheim. Inspector, John Vicary.

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Fig. 10. A. 2. 1000

Fig. 10. B. 2. 1000

repairs, reconstruction and improvement of old sewers, etc., under the general contract for 1905. Contractor, David Peoples.

Work under this contract was prosecuted at the following locations:

a. Reconstruction of the Cohocksink sewer in Thompson street, from west of Lawrence street to east of Fifth street. Length built, 118 feet of 11 feet diameter sewer, being an enlargement of the old sewer of 10 feet in diameter. Cost of the work, \$5,100.96. Inspector, Thomas MacElwee.

b. Construction of well-hole and connections thereto at the northeast corner of Tasker and Ninth streets and miscellaneous work upon manholes along the line of the Cohocksink sewer, at a cost of \$340.74. Inspector, P. D. Brown.

c. Rectification of channel of the Frankford creek at Powder Mill lane at a cost of \$238.90. Inspector, W. B. Thomas.

d. Reconstruction of the Mascher street branch of the Cohocksink sewer, from Thompson street northward. This work comprises the replacing of an old circular brick sewer, in very bad condition, with a rectangular section concrete sewer, 7 feet 6 inches by 6 feet 6 inches in dimensions and having a reinforced concrete roof. Length built, 309 feet at a cost of \$9319.25. Inspector, Thomas MacElwee.

The total cost for all work done under this contract during the year was \$14,999.85. Final estimate paid December 20, 1905.

Market Street Subway Sewers.

The construction and reconstruction of sewers in connection with the Market street subway was continued during the year, principally east of Seventeenth street. This work embraced the construction of the diversion sewer in

Mole, Ranstead and Fifteenth streets, south of Market street, between Fifteenth street and Sixteenth street. length and sizes built, 635 feet of 3 feet 6 inches diameter, 572 feet of 3 feet 3 inches diameter, 197 feet of 2 feet 6 inches by 1 foot 8 inches diameter brick sewer and 533 feet of 18 inches diameter terra cotta pipe sewer. Contractor, The E. E. Smith Construction Co. Inspectors, E. S. DeHaven and John Irvine.

The work and inspection enumerated above were without cost to the City. Application was made by the Philadelphia Rapid Transit Company and permit was granted to construct the two large sewers in Market street, from the Delaware river to Fourth street.

The State Department of Health.

An Act of Assembly of the State of Pennsylvania, approved April 22, 1905, created a Department of Health, and provided for the appointment by the Governor of a Commissioner of Health. One of the provisions of the act describing the duties of the Commissioner and of municipalities in their relations to the Department is as follows:

SECT. 6. It shall be the duty of the public authorities having by law charge of the sewer system, of every municipality in the State, and from which sewage was being discharged into any of the waters of the State at the time of the passage of this act, to file with the Commissioner of Health, within four months after the passage of this act, a report of such sewer system, which shall comprise such facts and information as the Commissioner of Health may require. No sewer system shall be exempt from the provisions of this act, against the discharge of sewage into the waters of the State, for which a satisfactory report shall not be filed with the Commissioner of Health, in accordance with this section.

SEWEPS.

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COLUMBIA

60 MILES

ENGINEERING

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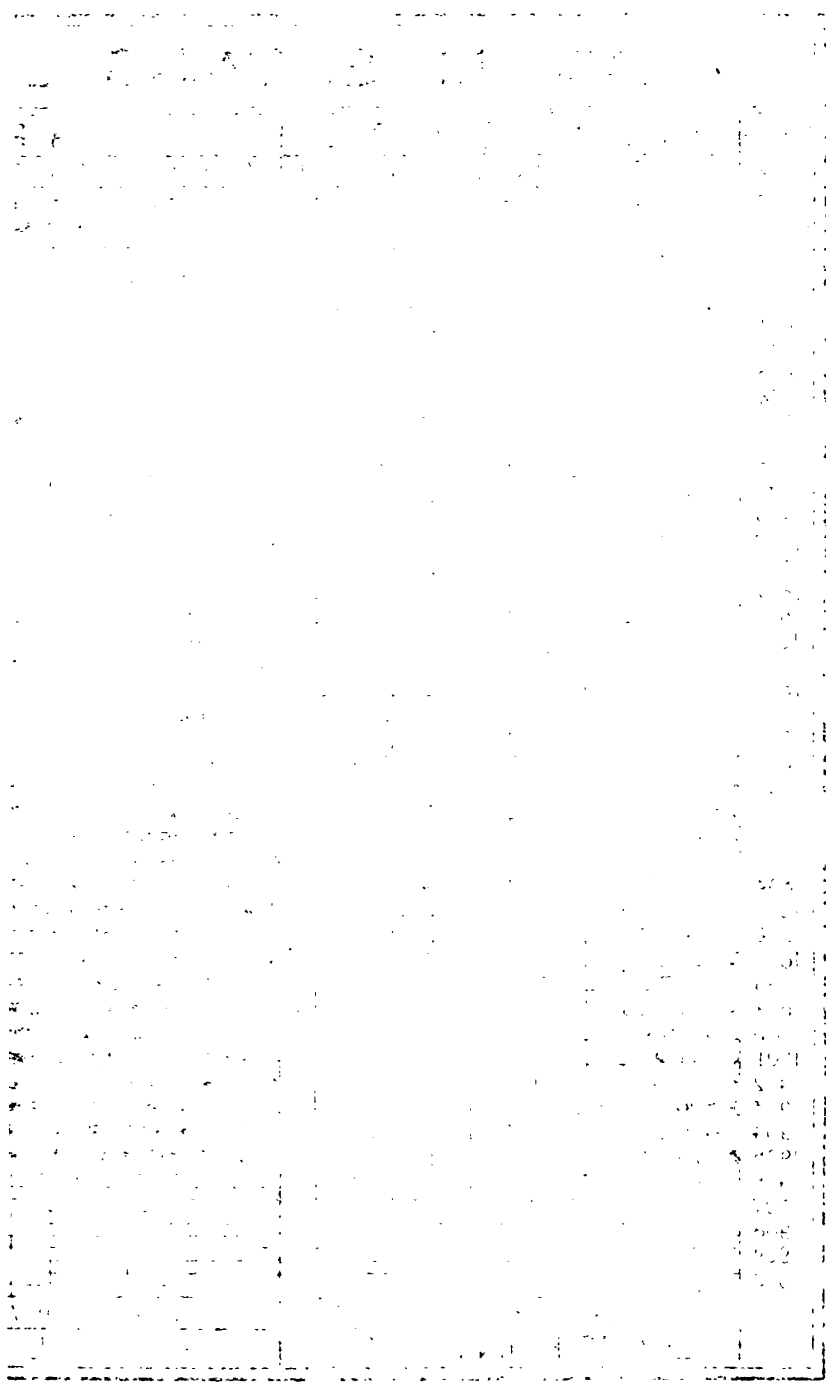
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ENGINEERING



Plans of the sewerage systems of this City were filed in accordance with this act on October 2, 1905.

The act gives the Commissioner power over all the waters of the State, and provides for the manner in which he may cause sewer systems to be constructed to remove causes of complaint when any streams are polluted by the discharge of sewage into them. The effect of the act may entail great expense upon municipalities, but will materially improve the sanitary conditions of the streams.

Branch Sewers and Inlets.

There was appropriated in the annual appropriation ordinance approved December 31, 1904, for branch sewers and inlets, the sum of \$175,000. An additional appropriation was authorized by ordinance of June 14, 1905 of \$25,000. Two transfers were made to this item, one of August 1, of \$28,043.41, and one of November 20, of \$1,058.86, a total of \$229,102.27.

The number of new contracts drawn for branch sewers was 127, and there were 155 contracts completed, some of them having been carried over from the previous year.

During the year there were constructed 19.577 miles of branch sewers at public expense, at a total cost as follows:

In warrants	\$224,461 99
Assessment bills	179,460 96
Inspection	33,996 22
	<hr/>
Total	\$437,919 17

There was appropriated for the reconstruction of inlets the sum of \$5,000. This was placed under contract.

Contracts were entered into for the construction and reconstruction of inlets, curved curbing, laterals, manholes, etc., and expenditures made to the amount of \$25,554.83.

The work was done under one contract for reconstruction

of inlets and under two contracts for the construction of new inlets.

The work accomplished comprised the construction and reconstruction of 211 inlets, not included in sewer contracts, the placing of 2,047 feet of curved and straight curbing in connection therewith, and the laying of 14,683 feet of lateral sewer connections.

A detailed statement of this work will be found in the appendix to this report.

Summary of Work upon Sewers.

The total number of main sewers under construction, some of which were carried over from last year, was 21.

Total length of all sewers built and inspected during 1905 was 32.473 miles divided as follows:

Main sewers	23,286.94 ft.	4.410 miles.
Branch sewers	103,370.22 ft.	19.577 miles.
Sewers at private expense	44,806. ft.	8.486 miles.
	<hr/>	<hr/>
Totals	171,463.16 ft.	32.473 miles.

Total length of sewers constructed:

Main sewers	167.339 miles.
Branch sewers	773.770 miles.
Sewers at private expense	100.098 miles.
	<hr/>
Total	1,041.207 miles.

There was expended for main sewers in 1905:

For construction	\$442,347 25
Cost of inspection	16,373 22
	<hr/>
Total	\$458,720 47

Sewer Connections and Records.

Sewer connections of 8,778 buildings were authorized during the year, which involved the issuing of 2,962 per-

mits (a decrease of 193 over 1904), with the usual inspection, draughting and return of the reports, as required by ordinance of April 3, 1883.

The permits issued in each month were as follows:

January	27	July	362
February	10	August	346
March	145	September	307
April	293	October	343
May	331	November	334
June	343	December	121

The number in each ward:

First	124	Twenty-third	127
Second	135	Twenty-fourth	62
Third	82	Twenty-fifth	239
Fourth	17	Twenty-sixth	111
Fifth	23	Twenty-seventh	143
Sixth	19	Twenty-eighth	30
Seventh	26	Twenty-ninth	59
Eighth	49	Thirtieth	81
Ninth	18	Thirty-first	96
Tenth	22	Thirty-second	14
Eleventh	14	Thirty-third	157
Twelfth	12	Thirty-fourth	178
Thirteenth	4	Thirty-fifth	12
Fourteenth	17	Thirty-sixth	118
Fifteenth	48	Thirty-seventh	22
Sixteenth	16	Thirty-eighth	86
Seventeenth	16	Thirty-ninth	104
Eighteenth	89	Fortieth	62
Nineteenth	85	Forty-first	32
Twentieth	43	Forty-second	24
Twenty-first	155	Forty-third	1
Twenty-second	190		

January	\$1,348	67	July	\$3,924	60
February	563	19	August	4,086	81
March	1,142	15	September	2,493	10
April	2,080	88	October	2,921	08
May	5,073	26	November	4,029	93
June	5,926	58	December	2,095	55

Recapitulation.

For sewer permits	\$16,538 80
For sewer bills	17,343 44
For sewer balances	265 16
For searches	1,201 50
For miscellaneous receipts	336 90
	<hr/>
	\$35,685 80

The character of drainage was :

Water closets	10,690	Slaughter houses	7
Surface	8,564	Ice houses	21
Sinks	7,941	Markets	40
Cellars	6,402	Breweries	15
Stables	480	For future use	1,285
Factories	206	Miscellaneous	4,206

Five hundred and eleven (511) drains were connected with the Manayunk Intercepting sewer and its branches, all of which were inspected by the supervisors of the Intercepting sewer.

The Bureaus of Water, Highways and Health have as usual been furnished with a daily list of all permits issued.

Three hundred and four (304) plans of main and branch sewers were received from the District Surveyors, which were duly registered and platted on the drainage sheets and atlases. Twenty-two (22) plans of lateral pipes put in old sewers were also returned.

The indexing of the Inspectors' books have been continued; the number received during the year was 256, making the total now in use 6,767.

Three inspectors of drain connections and two supervisors of the Manayunk Intercepting sewer have been continuously on duty during the year, and their weekly and monthly returns were promptly made. All moneys for permits, searches, balances, etc., were paid at the office of the Receiver of Taxes (ordinances of December 30, 1886), taking his receipt therefor.

The receipts of the Bureau from all sources (except District Surveyors) during the year were \$35,685.80 (an increase of \$5,353.47 over 1904).

General Plans for Improvement.

Much attention has been given to the planning and study of numerous projects for general municipal improvement, and many examinations, reports and plans have been made covering the abolishment of grade crossings of steam railroads, the extension of their systems and the construction of new lines by the railroad companies, the revision and extension of the street system, the extension of parks and parkways, and a variety of other matters of public importance which have been referred to the Bureau by the executive or legislative authorities or have grown from the expansion and development of those commercial and industrial enterprises which largely contribute to municipal progress and prosperity.

Abolishment of Grade Crossings.

No grade crossings have been abolished during the year, but many preliminary plans and estimates have been prepared for use in the negotiations which have been actively conducted between the City and the railroad companies for the abolishment of grade crossings along the Philadelphia, Germantown and Norristown Railroad (the Ninth street line) between Spring Garden street and Hunting Park avenue, a distance of $3\frac{1}{2}$ miles with 30 grade crossings, along the Richmond Branch of the Philadelphia and Reading Railway, between Somerset street and Richmond street, a distance of $1\frac{1}{4}$ miles with two grade crossings and several new streets to be opened, and along the Philadelphia and Trenton Railroad on Trenton avenue, between Norris street and Butler street, a distance of $2\frac{1}{2}$ miles with

33 grade crossings. These projects have been fully reported upon in previous years. It is probable that the negotiations will shortly be concluded and measures taken to commence the work for which a loan of \$4,000,000 was voted at the election held on November 7, 1905.

Preliminary plans have also been prepared for abolishing grade crossings and providing for the opening of new streets along the Norristown Branch of the Philadelphia, Germantown and Norristown Railroad, between Seventeenth street and Ridge avenue, Manayunk, along the North Penn Railroad (American street line), between Montgomery avenue and Allegheny avenue, and along the Germantown and Chestnut Hill Branch of the Philadelphia and Reading Railway, between Armat street and Baynton street and between Sharpnack street and Mt. Airy avenue; between the latter points the railroad company has agreed to raise the grade of its tracks at its own expense so that the grade crossings at Mt. Pleasant avenue and Gorgas lane may be eliminated and Philellena street opened; \$70,000 has been appropriated for the construction of bridges on the lines of these three streets and the work will probably be done during the coming year.

Railroad Extensions and Improvements.

The construction of the New York Short Line Railroad and the reconstruction of the Philadelphia and Newtown Connecting Railroad and the Philadelphia, Newtown and New York Railroad authorized by ordinances approved April 4, 1904, has been actively carried on by the railroad companies. The conditions under which this work is being done are fully described on page 100 of the report for 1904.

An ordinance of Councils approved December 23, 1905, authorized the Pennsylvania Railroad Company to construct a branch or improved line of its railroad, from a

point in its present main line near Fifty-sixth street to the County Line near Woodbine avenue, a distance of about $2\frac{1}{2}$ miles. A tunnel about half a mile long will be constructed under Malvern avenue, from Lancaster avenue to a point east of Sixty-sixth street and all other streets will be crossed by over head or undergrade bridges. A revision of the lines and grades of streets is authorized and the railroad company is obligated to pay all damages which may be caused by such revision and to pay the cost of reconstructing all sewers, drainage channels, water pipes, electrical conduits and other municipal structures affected by the work authorized by the ordinance; also to construct and forever maintain all bridges, both railroad and highway, now or hereafter required upon the line of any street now, or hereafter placed upon, the City plan crossing the said railroad.

The railroad company is further required to maintain highway travel during the construction upon all streets now open across the line of the railroad and to restore such streets to their original condition; also to dedicate to the City as much of the property owned or controlled by it as may be required to open or widen any street now upon the City plan or placed thereon under authority of the said ordinance, and to release the City from all liability for damages for the opening, grading or changing of grade of any street or road upon or across any property owned or controlled by it within the territory covered by the authority to revise.

All plans for the construction of bridges or municipal structures and for work affecting the public highways are made subject to the approval of the Director of the Department of Public Works, and the railroad company is required to file a bond in the sum of two hundred and fifty thousand (250,000) dollars, conditioned upon faithful

compliance with all the terms and provisions of the ordinance.

A change in the elevation of the tracks of the Philadelphia, Baltimore and Washington Railroad between Washington avenue and Thirty-sixth street has been suggested to permit the opening of additional streets from the rapidly growing section southeast of the railroad into Gray's Ferry avenue.

City Plan Revision.

A considerable amount of work has been done in the preparation of plans for the revision and improvement of the system of streets projected in undeveloped sections of the City.

The experiences of recent years have demonstrated that a great many of our most important highways are much too narrow to accommodate either the travel on the surface or the municipal and public service structures beneath the surface. The Bureau of Filtration has experienced much difficulty in finding available streets of sufficient width to accommodate the mains for the new water supply; inconvenience and delay in the movement of traffic and the transaction of business is constantly resulting from the congested condition of the streets, and rapid transit upon the narrow streets is practically impossible.

This condition cannot be improved in the built up section of the City except at enormous expense for widening or opening of streets, but the extension of the evil to other sections may be prevented by judicious revision and the establishment of wide and direct avenues between important points and the projection of a general system which shall provide more generously for the future growth of the City.

In cases where considerable damage may result, streets are only altered by special authority from Councils, but under general authority the Bureau is gradually evolving

plans for extensions and improvements in which it is believed ample provision is made for meeting the requirements of the future.

Parks, Parkways and Boulevards.

Plans for a number of improvements of this kind are in course of preparation.

Burholme Park, a tract of about 48 acres near Fox Chase, was accepted as a gift from the estate of Robert W. Ryerss and placed in the charge of the Commissioners of Fairmount Park by ordinance approved July 27, 1905, and was placed upon the City plan by confirmation by the Board of Surveyors, November 11, 1905. This property is a very desirable addition to the park system of the City and is **particularly well adapted for park purposes**; it includes the highest ground in that section of the City and from the cupola of the mansion which occupies a commanding knoll a magnificent view is obtained. The mansion contains a library and a valuable and interesting collection of works of art and curios gathered from all parts of the globe, all of which accompany the gift and become the property of the City.

The topographical survey of the proposed park which is to include about 1,000 acres of land adjacent to the Penny-pack creek is about completed and work upon the plan of the park has been commenced.

The loan bill of May 18, 1904, contains an item of two million (2,000,000) dollars for the Parkway from City Hall to Fairmount Park. This Parkway was placed upon the City plan Nov. 7, 1904, and it was hoped the cost of opening the section from Logan Square to the Park might fall within the amount appropriated in the loan; an investigation showed that the expense of opening would exceed that amount and a number of studies were made with

a view of reducing the cost; these resulted in a decision to change the location of the western section by moving it further toward the northeast to a position which would make the centre line coincident with a line drawn from the Washington Monument to the City Hall, to widen it west of Twenty-second street to include Pennsylvania avenue and to reduce the width between Logan Square and Twenty-first street to 200 feet. An ordinance to authorize this change was passed by Councils in December, and awaited the signature of the Mayor to become a law.

Rapid Transit Subway.

The construction of the Subway, from the western portal, west of Twenty-third street, under Market street to Fifteenth street was completed and thrown open to travel December 17.

The bridge across the Schuylkill river with accommodation for 4 lines of travel, two for the surface lines and two for the elevated traffic, was completed and utilized in connection with the Subway.

During the Summer and Fall, work was begun along West Market street upon the elevated structure.

Columns and floorings were placed in position between Sixty-first street and Sixty-third street and between Fortieth and Forty-fifth streets. This work was interfered with by strikes.

The type of construction provided for lines of column outside of the two lines of surface tracks, supporting cross girders and solid trough floor, to be filled with ballast carrying the ties and rails.

The construction of that part of the Subway around City Hall was authorized by the Board of Highway Supervisors and the company has indicated its intention by beginning the work at once.

The work of placing column foundations on Delaware avenue from South street to Arch street for the elevated structure and the stations between Market and Chestnut streets and at South street has also been authorized.

In connection with the construction of the Subway on East Market street, two large main sewers must be built, from the Delaware river to Thirteenth street. That portion of the sewers between Delaware river and Fourth street has been authorized, and it is expected the work will be started at once.

General plans for other portions of the work have been submitted in a preliminary way for discussion prior to preparing the working details.

The plans are required to be approved by the Director of the Department of Public Works, and the construction and methods of operation are subject to his supervision.

Rainfall, Discharge and Tide Observations.

Continued observations and compilations of data on rates of rainfall and relative run-off in sewers were made. The accompanying tables show the rainfall in different sections of the City. It is interesting to note the differences in the amounts of the monthly rainfall in these sections. The average precipitation for the year in all parts of the city is 39.85 inches. The U. S. Weather Bureau gives the average for the year 41.61 inches.

It has been very gratifying to the Bureau to note so far an actual relief in the neighborhood of Ninth and Berks streets, which was generally flooded in severe storms, and although the City was visited this year with few severe storms, still the one on August 6 was a very heavy down-pour, the rate, the highest recorded in this office, viz: $7\frac{1}{2}$ inches lasting for 9 minutes, nevertheless the above mentioned district was free from flooding. This was caused

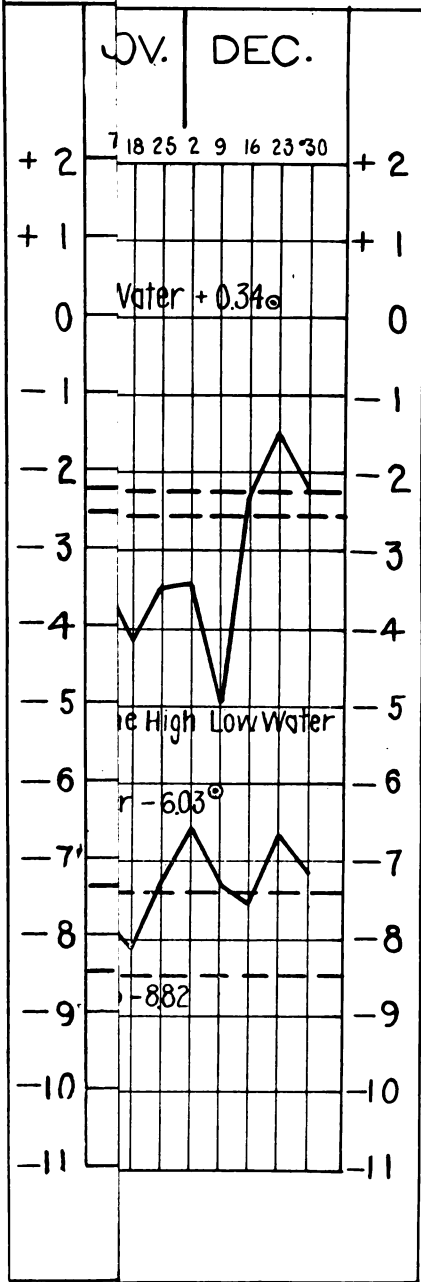
by the finishing of the Berks street sewer thereby relieving the Norris and Ninth street sewers. In this immediate vicinity the city has several stream gauges and it has therefore been possible to compute the percentages of the total run-off in each sewer.

Tidal observations were continued at Arch street wharf. We had few high or low tides, which might be called extreme. The high tide registered lower than usual the mean being—2.54. The mean low tide recorded is—7.40. The mean high tide recorded for the last six years is—2.35, and mean low tide recorded for the same period is—7.53, still being about one foot higher than the established low water plane—8.52. One notable feature of the tides occurred from Dec. 5 to 10 inclusive, when high tide recorded —5.71 and low tide—7.26, showing a variation of only 1.55 feet which is rare, besides such low high tide is seldom recorded in Philadelphia.

The variation of tides for the last 6 years 5.18 feet, the established variation is 6.27 ft.

The first three months of the year were noted for the extreme cold, the accumulated deficiency in temperature on March 1 being 25° consequently no tide records were obtainable for this period.

DREET PIER



Rainfall (in inches) in City of Philadelphia during 1905.

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1905.	South Philadelphia.	Central Philadelphia.	Manayunk.	German-town.	Frankford.	West Philadelphia.	Average Rainfall.	U. S. Weather Bureau.
	2d Dist.	7th Dist.	8th Dist.	9th Dist.	10th Dist.	11th Dist.		Post Office Building.
January.....	1.78	2.08	*2.01	1.90	2.08	2.24	2.01	3.12
February.....	*1.97	2.35	*2.19	*2.54	2.43	2.24	2.29	2.56
March.....	*3.77	4.15	*4.04	*3.88	4.00	4.42	4.04	4.18
April.....	3.25	3.87	*3.52	3.17	3.67	3.64	3.52	3.58
May.....	1.68	2.07	*1.71	1.57	1.85	1.88	1.71	1.41
June.....	1.59	1.90	*1.79	1.88	1.79	1.70	1.79	1.77
July.....	*3.86	3.66	3.84	3.80	3.75	1.94	3.88	3.11
August.....	*8.39	7.82	7.08	7.32	6.25	7.56	7.40	9.57
September.....	*3.92	3.88	4.11	2.97	4.42	3.60	3.83	3.65
October.....	4.07	4.13	4.33	3.06	3.73	4.18	4.07	4.07
November.....	1.84	1.96	2.17	1.77	1.80	2.14	1.95	1.61
December.....	3.00	3.72	4.62	4.52	3.53	3.79	3.86	2.98
Totals.....	39.12	41.63	41.41	39.97	38.75	38.82	39.85	41.61

* Estimated.

Average yearly rainfall from 1890 to 1905, inclusive=41.42 inches.

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Details of Most Severe Storms.

1905.	Record at		Precipitation. Inches.	Duration. Hours.	Mean Rate per Hour. Inches.	MAXIMUM RATE PER HOUR.		Max. Fall in One Hour. Inches.
	Locality.	District.				Inches.	Minutes.	
March 19th and 20th	West Philadelphia.....	Eleventh	0.54	7½	0.07	1.82	5	0.20
April 4th, 5th and 6th.....	Central Philadelphia..	Seventh..	1.48	30½	0.05	2.75	3	0.35
April 4th, 5th and 6th.....	Germantown	Ninth....	1.43	31	0.05	3.00	3	0.47
July 11th.....	South Philadelphia....	Second ..	1.57	2½	0.63	2.60	9	0.98
July 11th.....	Frankford.....	Tenth....	1.21	2¼	0.44	3.80	3	0.62
August 6th.....	Germantown.....	Ninth....	2.33	1	2.33	7.50	9	2.33
August 6th.....	Frankford.....	Tenth....	1.34	3¾	0.36	0.94	25	0.33
August 6th.....	Manayunk	Eighth...	1.99	1¼	1.60	4.72	5	1.95
August 25th	South Philadelphia....	Second ...	2.09	12	0.17	3.06	20	1.40
August 25th.....	West Philadelphia.....	Eleventh	2.51	16	0.16	2.95	4	1.38

Laboratory for Testing Cements and Building Materials.

The continued advance in both the quality and quantity of construction work performed by the various Bureaus of the City has led to a still further development in the capacity and scope of the testing laboratory, while the introduction of new equipment and methods has advanced both its economy and efficiency.

The cost of testing the various materials used by the City whose value usually exceeds \$1,000,000 a year is less than one per cent. of this amount, whereas if the same testing were performed by private laboratories, the cost would probably be $2\frac{1}{2}$ or 3 per cent. The City therefore receives not only the great advantage of having all the materials thoroughly inspected and tested, thus securing the best grades of these materials, but also conducts this work on a most economical basis.

The testing of cement which constitutes the major part of the routine work of the laboratory has covered the examination of 1,338 shipments of cement, 785 of which were Portland and 553 were naturals, each one of the shipments being tested for strength, fineness, time of setting, specific gravity and soundness. Chemical analyses also are frequently made. The results of these tests are shown in the appended tables.

The testing of cubes of concrete made on the site of the construction work is also a valuable part of the laboratory's routine, these tests indicating both the quality of the materials, and the character of the workmanship in handling them.

Several other materials are also tested in regular routine, —asphalt and bricks for use in street paving, cast iron for water pipe, etc., while such materials as steel, paints, oils, wood, wire-rope, sand, stone, etc., are tested when occasion demands.

The new chemical laboratory, equipped last year, has rendered valuable aid in the efficient conduct of these tests, as well as providing the means of making many tests that heretofore the laboratory has been unable to make.

In addition to the regular routine, investigations of the character and properties of the construction materials are continually being made, which secure more economical design, safer construction, and also increases the effectiveness and utility of the tests.

The work performed in the laboratories is of a distinctly high character and the results of its investigations are considered authoritative to the technical world, so that the City not only receives great benefit from its laboratory, but also gives much of value to the engineering profession.

The usual tables and diagrams detailing the tests are appended in the tabular portion of the report.

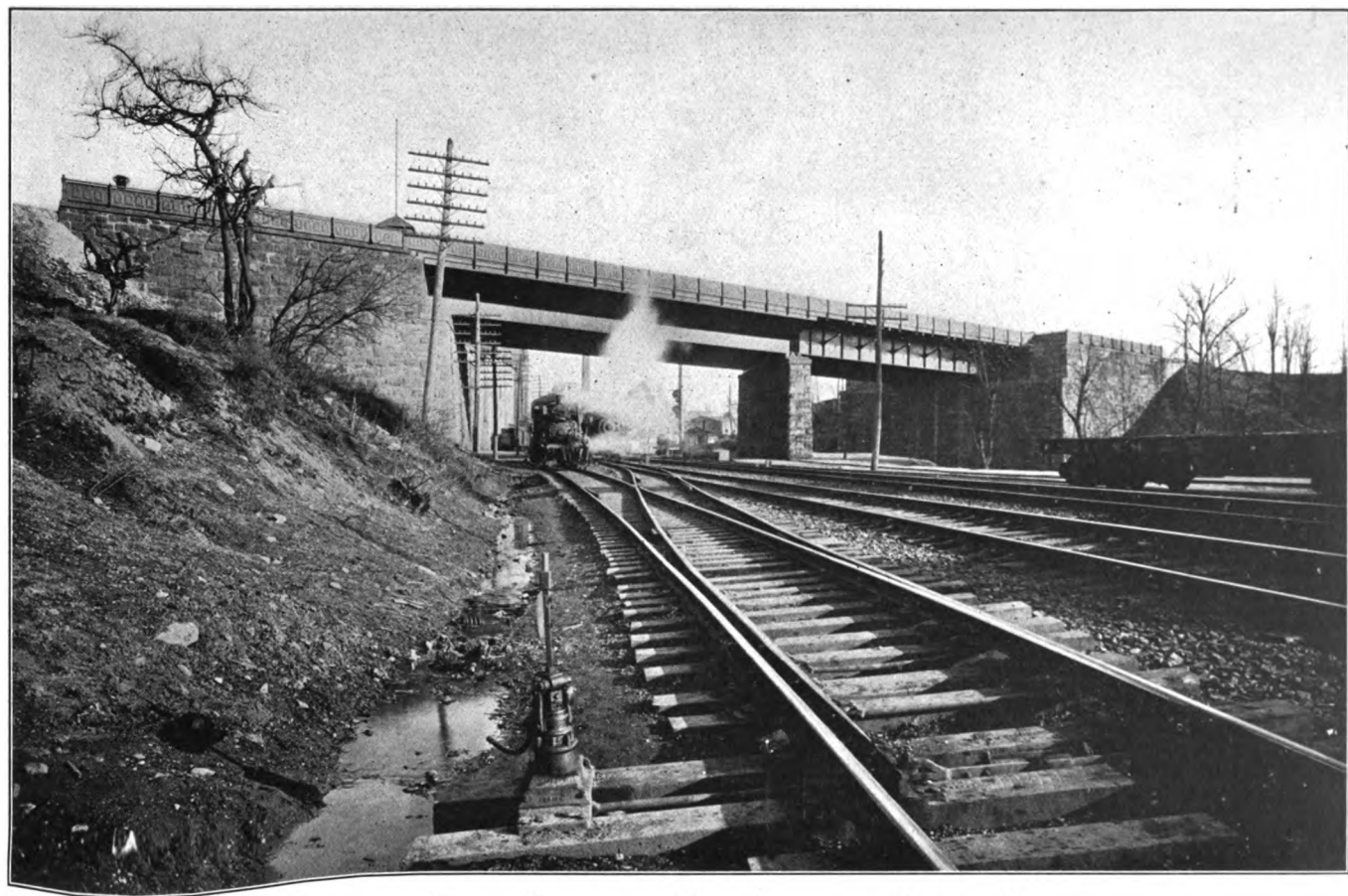
Bridges.

The funds available at the beginning of the year were as follows:

Item 17—Balance from 1904	\$15,512 34
Item 18—New bridges (balance Item 21½) ..	993,664 02
Item 21—New bridges (balance Item 21)	46,551 51

By ordinance approved June 27, 1904, \$1,000,000 of the Loan of May 18, 1904, was appropriated for new bridges (Item 21½).

By ordinance approved August 11, 1904, \$500,000 of this appropriation was apportioned for new bridges as detailed in the report of 1904.



THIRTY-THIRD STREET BRIDGE OVER PHILADELPHIA & READING RAILWAY.

Under the authority of this ordinance contracts were entered into as follows:

	Limit of Cost to City.
Thirty-third street over the Connecting Railway and over the Philadelphia & Reading Railway (two bridges)	\$80,000
Erie avenue over the Richmond Branch of the Philadelphia & Reading Railway.....	50,000
Hunting Park avenue over the Richmond Branch of the Philadelphia & Reading Railway (one-third of cost to be paid by the Phila. & Reading Railway Co. and one-third by the Phila. Rapid Transit Co.).....	16,000
Allegheny avenue under Connecting Railway (Pennsylvania R. R. to pay \$40,380).....	75,000
Graver's Lane over Chestnut Hill Branch of the Phila. & Reading Railway (one-half of cost to be paid by P. & R. Ry. Co.).....	8,000
The Boulevard over North Penn. Railroad	37,000
	\$266,000

The Wyoming avenue bridge over the Philadelphia, Newtown and New York Railroad was not proceeded with because of the incompleteness of negotiations with the railway companies for contributions to its cost, and the Boulevard bridges over the Newtown Railroad and over Tacony creek and Ashdale street are still awaiting the opening of the Boulevard beyond Second street.

By ordinance approved July 13, 1905, the available balance of the appropriation of June 27, 1904, was appor-

tioned for the construction of the following new bridges:

Allen's lane over Wissahickon creek.....	\$30,000
Twenty-fifth street under Connecting Railway.....	65,000
Front street over the main tracks of the Connecting Ry. (the Pennsylvania R. R. Co. to construct the approach spans over the remaining tracks).....	45,000
Mt. Pleasant avenue, Gorgas street and Phillelana street under Chestnut Hill Branch of the Phila. and Reading Railway	70,000
Walnut lane over Wissahickon creek.....	190,000

Sedgley avenue over Richmond Branch of Phila. and Reading Railway	40,000
Spring Garden street bridge over Schuylkill river—new west approach	100,000
	\$540,000

The plans for these bridges have been completed and the bridges will be placed under contract in time for beginning work when the season opens in the Spring.

There was expended during the year under bridge contracts and charged against the various items, the following:

Item 17	\$15,501 49
Item 18	201,581 68
Item 21	46,551 51

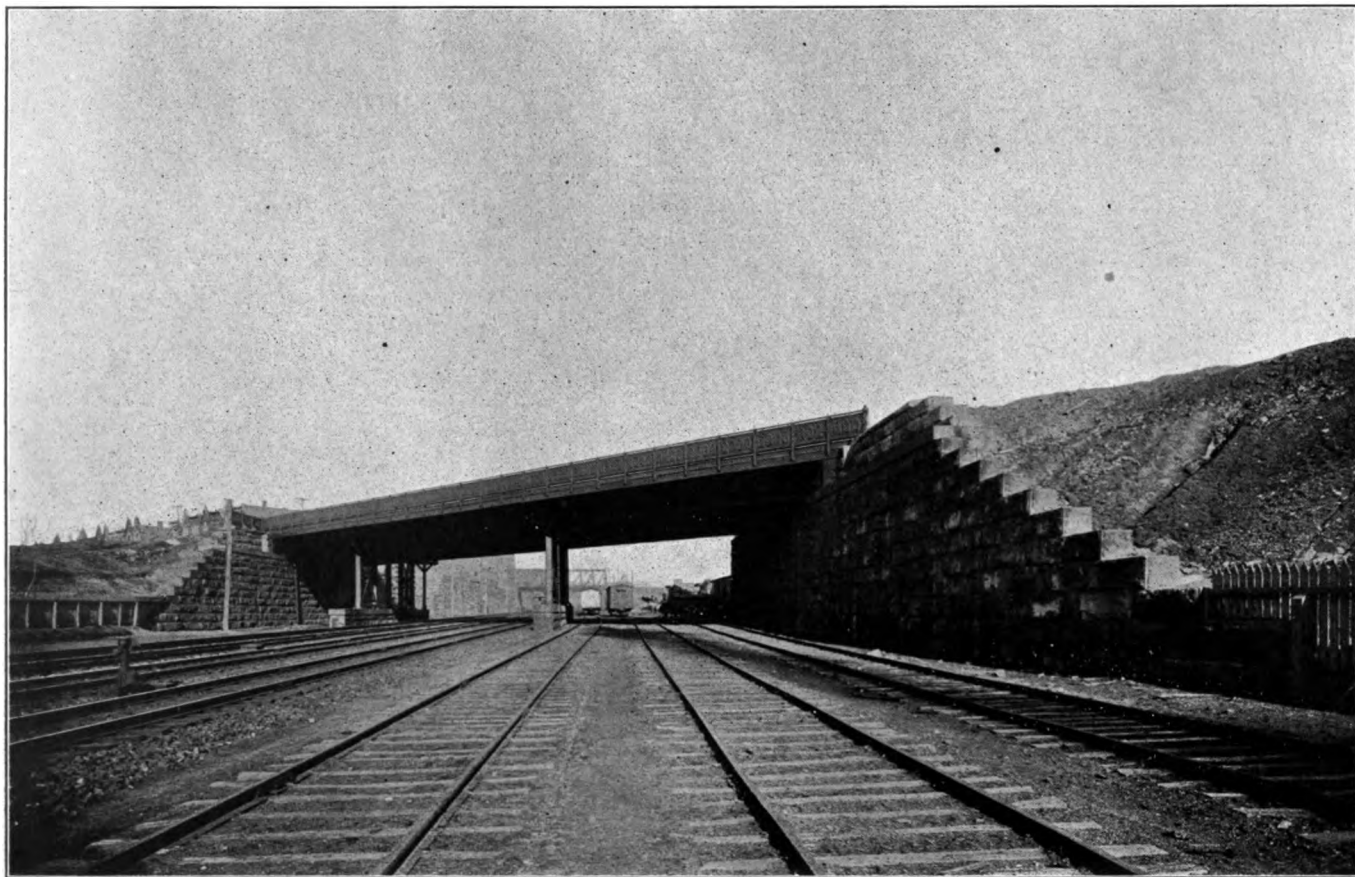
At the beginning of the year only one uncompleted bridge contract remained from the number provided for in the loan of June 17, 1898,—the four piers and abutments of the west approach to proposed Passyunk avenue bridge over the Schuylkill river. This contract was completed and final estimate made Feb. 27, 1905.

Of the contracts made under the Ordinance of Aug. 11, 1904, the following have been completed:

Thirty-third street bridge over the Connecting Railway and the Philadelphia & Reading Railway.
Hunting Park avenue over the Richmond Branch of the Philadelphia and Reading Railway.

Thirty-third Street Bridges.

The Thirty-third street bridges have not yet been opened to vehicle travel because the grading of the street which is being done under contract in the Bureau of Highways has not been fully completed. These bridges give to the residential section north of the Connecting Railway direct access to Girard avenue and West Philadelphia. The total cost of this contract which completes the bridges was



THIRTY-THIRD STREET BRIDGE OVER CONNECTING RAILWAY.



HUNTING PARK AVENUE BRIDGE OVER RICHMOND BRANCH PHILADELPHIA & READING RAILWAY.

\$77,587.80, making the cost to the City of the entire operation, which was commenced and continued under two previous contracts, \$301,635.13. Contractor, The Millard & McGraw Construction Co. Inspector, E. H. Sickels; Inspector of steel work, J. A. Colby.

Hunting Park Avenue Bridge.

The Hunting Park avenue bridge over the Richmond Branch of the Phila. and Reading Railway replaces an old wooden bridge inadequate for street car and highway travel and without sidewalks. It is 85 ft. wide, having driveway and two wide sidewalks of deck steel plate girder superstructure on concrete abutments, with span sufficient for four railroad tracks below, and carries a double line of street car tracks for the extension of the Nicetown Division of the Philadelphia Rapid Transit Company's Railway. The cost of this bridge was shared with the City by the Phila. and Reading Railway Company and the Phila. Rapid Transit Company, each paying one-third. The total cost to the City was \$15,342.21. Contractor, Daniel J. McNichol. Inspector, John Barlow; Inspector of steel work, R. W. Hunt & Co.

Erie Avenue Bridge.

The Erie avenue bridge over the Richmond Branch of the Philadelphia and Reading Railway is entirely new and gives a much needed and safe means of communication between populous and developing sections, the nearest crossing of this road being a grade crossing at Venango street.

The bridge is a deck plate girder structure on concrete abutments, has asphalt paved driveway 64 feet wide and two granolithic sidewalks 12 feet wide in the clear, and has two lines of street car tracks laid over it. The contract price is \$45,257, of which \$36,640.18 has been paid. Con-

tractor, Henderson & Co., Ltd. Inspector, John E. Peters; Inspector of steel work, R. W. Hunt & Co. The bridge is now in full use by the public.

Graver's Lane Bridge.

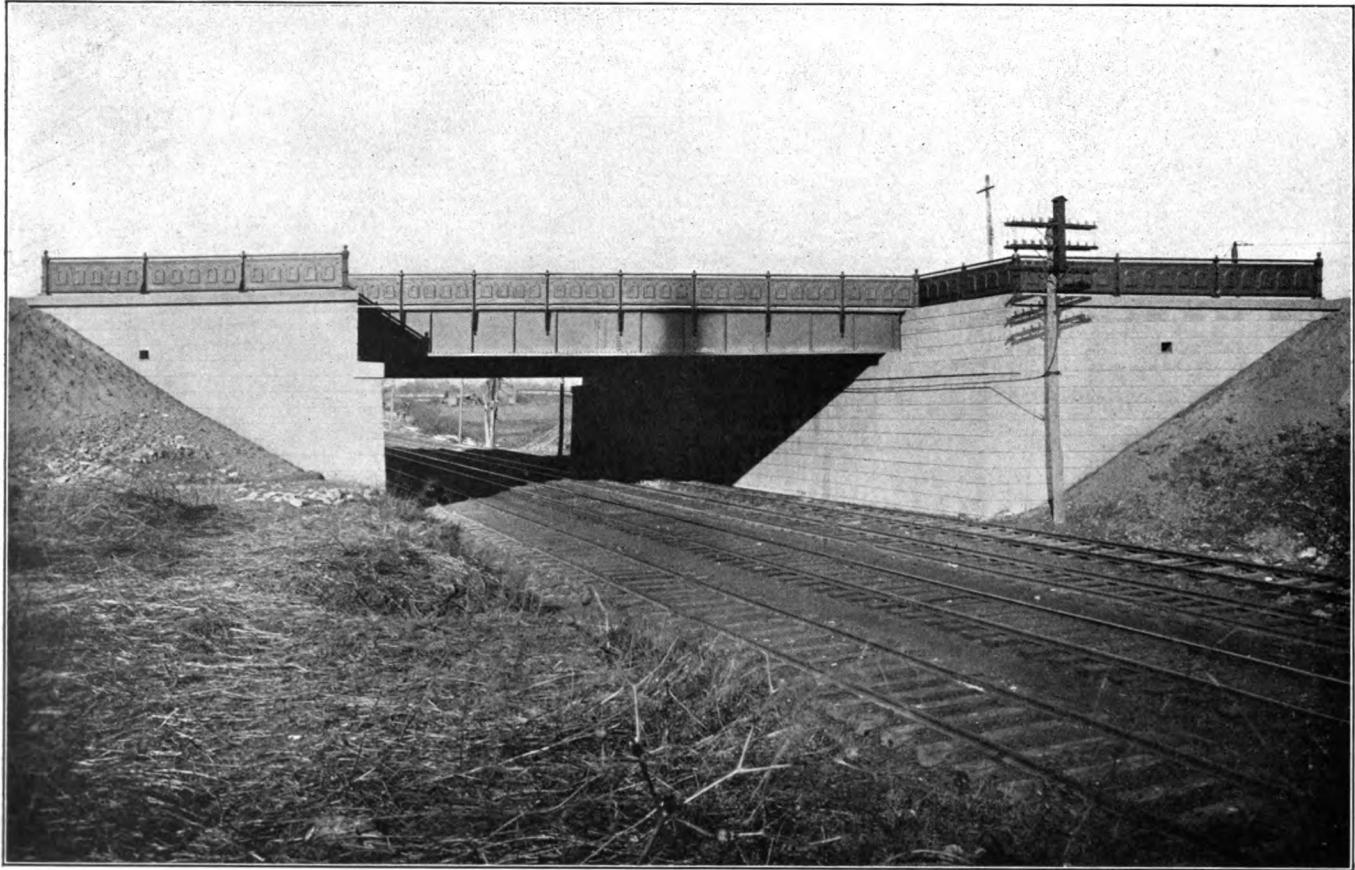
The Graver's lane bridge over the Chestnut Hill Branch of the Phila. & Reading Railway replaces an old wooden trestle without sidewalks. It is a reinforced concrete arch taking the full width of the street—50 feet—with macadamized driveway 30 feet wide and two granolithic sidewalks. The parapet is also of concrete and no steel is anywhere exposed to corrosion. The contract price is \$14,000 including the grading and macadamizing of the approaches. One-half of the cost is borne by the Philadelphia and Reading Railway Company. Amount paid by the City to date \$5,154.14. Contractor, John McMenamy. Inspector, Thomas W. Harvey. This bridge is now open to travel.

Boulevard Bridge.

The Boulevard bridge over the North Penn. Railroad has been completed with the exception of the macadamizing of the driveway which has been deferred until Spring to give the filling time to consolidate, the Boulevard approaches on each side being incomplete and not in use by the public. This bridge, of span sufficient for four railroad tracks—67 feet clear—is an ornamental arch of reinforced concrete, 100 feet wide, giving 76 feet wide macadamized driveway and two 12 feet granolithic sidewalks. The contract price is \$32,500, of which 25,220 has been paid. Contractor Daniel J. McNichol. Inspector, Daniel Walsh.

Allegheny Avenue Bridge.

The Allegheny avenue bridge under the Connecting Railway is over three-fourths completed, the steel work



ERIE AVENUE BRIDGE OVER RICHMOND BRANCH PHILADELPHIA & READING RAILWAY.



GRAVERS' LANE BRIDGE OVER CHESTNUT HILL BRANCH PHILADELPHIA & READING RAILWAY.

being all delivered on the ground, the abutments nearly ready for the girders, and the column piers in the street well under way. The Pennsylvania Railroad Co. is contributing \$40,380 to the cost of the bridge, and, by independent arrangement with the contractor is paying the extra cost of a solid ballasted floor on the portion carrying the four main tracks. The contract price exclusive of the solid floor is \$106,327. The City's share of this is \$65,947, and the City's liability, in contemplation of possible extra foundations being required, is limited to \$75,000. The amount paid by the City thus far is \$42,787.50. Contractor, Henderson & Co., Ltd. Inspector, E. H. Sickels; Inspector of steel work, Pennsylvania Railroad Co.

BRIDGES AUTHORIZED BUT NOT YET UNDER CONTRACT.

Wyoming Avenue over Newtown Railroad.

This bridge was authorized in 1904, and the delay in placing it under contract was due to efforts to secure contributions to its cost from the railroad and railway companies interested. As the result of those efforts the Philadelphia and Reading Railway Co. will contribute one-third of the cost of the bridge (the estimated cost being \$42,000) and the Philadelphia Rapid Transit Co. in lieu of a direct contribution toward the cost of the bridge, has agreed to grade Wyoming avenue the full width from the bridge westward to Fifth street and from the bridge eastward to Old Second street pike at its own expense, and to maintain travel on the street and sidewalk during the construction of the new bridge, and to waive all claims for damages to its contiguous property attendant on the change of grade.

This bridge will abolish a dangerous grade crossing at a busy point, used by double track street railway line, and will very much improve the grade of the street between Old Second street pike and Fifth street.

The plans contemplate a reinforced concrete arch of ornamental design, of 60 feet span to provide for four tracks on the railroad, and of the full width of Wyoming avenue—80 feet.

Allen's Lane over Wissahickon Creek.

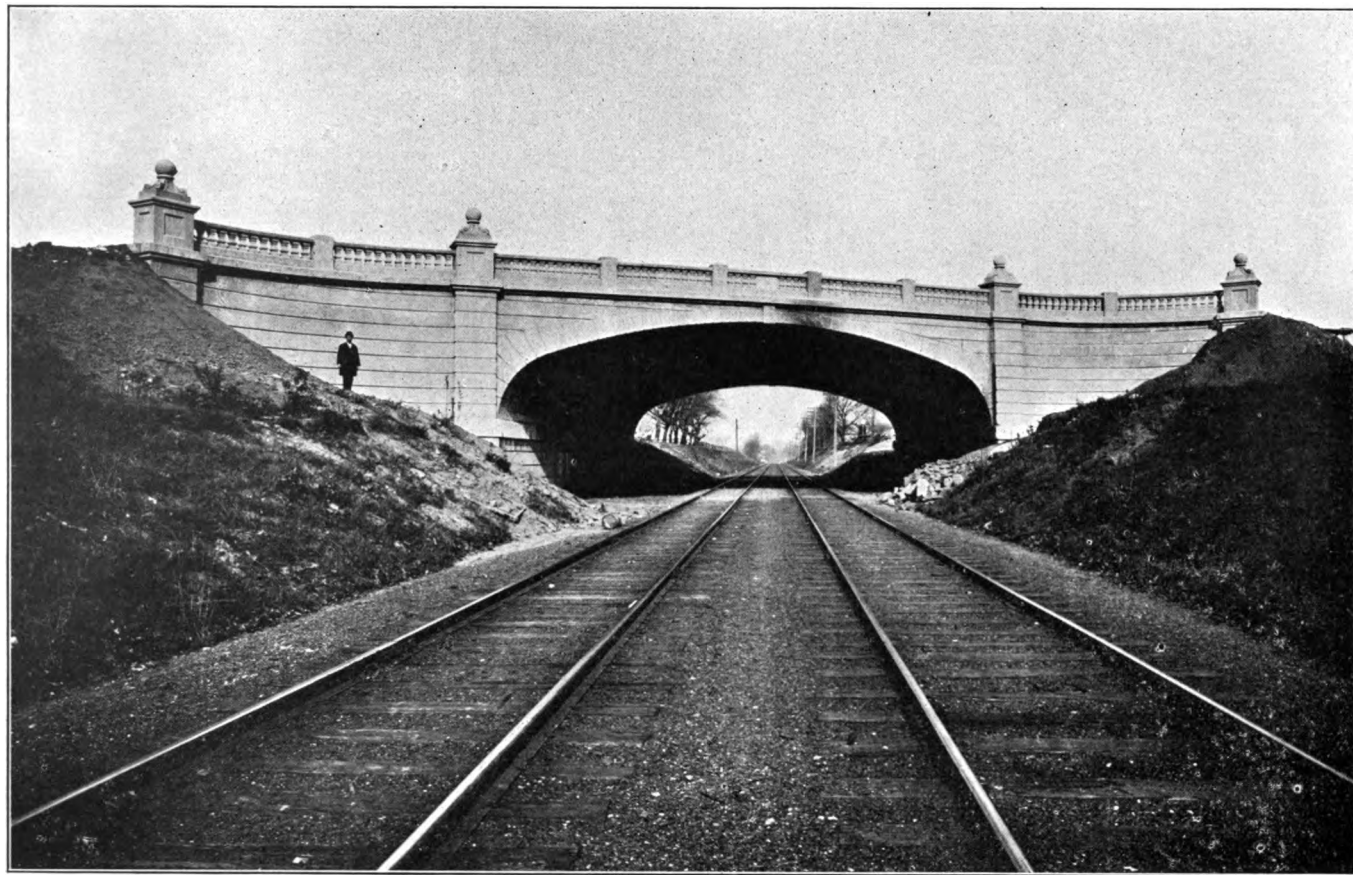
This structure will restore communication between Roxborough and Germantown at a point where a bridge existed for many years until destroyed by a freshet in the Wissahickon creek. It will be a stone arch bridge of two 55 ft. spans, designed to be architecturally in keeping with the rustic surroundings.

Twenty-Fifth Street under Connecting Railway.

This bridge will afford a long desired convenience to two populous sections and will provide the means for the extension of trolley facilities. As the result of negotiations, the Pennsylvania Railroad Company will bear the cost of the steel superstructure, carrying its main tracks and sidings, and the City's share of the work will be the grading of the street, the construction of a sewer, from Glenwood avenue to the present sewer in Sedgley avenue, and the construction of the masonry abutments and column piers.

Front Street over the Connecting Railway.

The ordinance authorizes this bridge over the main tracks with the proviso that the Pennsylvania Railroad Company shall build the approach spans over its remaining tracks. The railroad company has entered into a formal agreement with the City to construct the three approach spans complete with the necessary additional masonry in accordance with the plans and specifications of this Bureau, simultaneously with the City's work on the main span,



BOULEVARD BRIDGE OVER NORTH PENN RAILROAD.

and the work is therefore now ready to be placed under contract.

The bridge will permit the extension of street car facilities to the large section north of the railroad, and will materially advance its development. It will be an asphalt paved steel bridge partly deck and partly half through, with 50 feet driveway, $12\frac{1}{2}$ feet sidewalks and double track street railway.

Mt. Pleasant Avenue, Gorgas Street and Philellena Street.

These bridges under the Chestnut Hill Branch of the Philadelphia and Reading Railway will abolish two present grade crossings, those on Mt. Pleasant avenue and Gorgas street, and open one new street in a district that is being extensively improved. Some delay in the preparation of plans has been caused by the necessary adjustment of the matter of grades on the railroad and the streets. An agreement has been reached with the railway company which will co-operate with the City by elevating the railroad tracks, and the plans are now nearly ready for advertisement.

Walnut Lane over Wissahickon Creek.

This bridge will furnish what has been long and urgently needed—a direct connection with easy grades, between Germantown and Lower Roxborough, where at present the only routes are long and roundabout with very heavy grades. The plans which are nearly completed embody the results of a thorough study of the conditions and a comparison of careful estimates of cost of various designs. The design adopted comprehends a structure of concrete with a single arch over the drive and creek of 225 feet clear span and four approach spans of 53 feet clear each, the total length being 520 feet. The driveway will be 40 feet wide asphalted and the sidewalks $8\frac{1}{2}$ feet wide in the

clear, granolithic paved, making a bridge 60 feet wide over the parapets which will be ornamental balustrades with refuge bays over the piers constructed entirely of concrete in the manner that has been successfully and satisfactorily employed on several of our concrete arches. The design is adapted to the profile of the ravine at the point of crossing, and the long span arch, which exceeds in size any masonry arch in this country and is exceeded by very few abroad, will be majestic and imposing in its proportions and the structure will be monumental and notable.

Sedgley Avenue over Richmond Branch.

This bridge will save a considerable detour to the people of the Thirty-third Ward. The approaches to the bridge have been graded for a number of years. The nearest present crossing of the railroad is Tioga street which is at grade and therefore dangerous.

The bridge will be a steel deck plate girder with asphalt driveway 34 feet wide and two granolithic sidewalks.

Spring Garden Street Bridge—New West Approach.

The present structure was found to be so badly corroded as to be unsafe and had to be bolstered and trestled with wood, and the necessity for rebuilding it gives opportunity for widening it to relieve the congestion and danger of vehicle travel on the bridge. The plans therefor call for the new structure, which is of steel deck plate girder construction, to have a 40 feet wide asphalted driveway with 10 feet granolithic sidewalks, matching the extension built over the new tracks of the Pennsylvania Railroad three years ago.

This approach, with the bridge over the river, was built in 1875 to abolish a grade crossing of the railroad. As the street had been in use before the railroad was built the

City claimed the co-operation of the railroad company in the project. The nearness of the railroad to the river precluded a rising grade from Thirtieth street and a double deck bridge over the river was thus necessitated, with the graded approach on the east side, entailing an expenditure of about \$750,000. Toward this expense the Pennsylvania Railroad Company contributed the cost of the one approach span over its main tracks—approximately \$75,000.

As the deterioration of the structure has been caused principally by the railroad locomotive gases, this Department requested the railroad company to share the cost of rebuilding it, but it was not until the matter was taken up and pressed directly by his Honor, Mayor Weaver, that the railroad company conceded the City's claim and accordingly the company agreed to contribute \$25,000 to the cost of the new structure and the amount has already been paid into the City Treasury.

Improvement of the Channel of the Delaware River.

The last work done under the auspices of the City of Philadelphia toward the improvement of the channel of the Delaware river, consisted in the formation of a channel twenty-six (26) feet deep at mean low water and six hundred (600) feet wide through the shoals along Tinicum Island range and was completed in 1902, under Contract No. 9 by the removal of 538,937 cubic yards of material which was put ashore beyond high water on League Island Park. It was originally intended to devote a portion of the \$400,000 from the Loan of June 11, 1902, to the Delaware river channel. It being understood, however, at that time, that the United States Government would make the necessary appropriations for this work, the entire above amount was devoted to the Schuylkill river.

Appropriations were made by the United States and work was begun on the Delaware river 30-foot channel

project, the money appropriated being expended in the lower portions of the river and on the rock area at Schooner Ledge. The amount available, however, was sufficient only to bring the 30-foot channel to about the south line of the State of Pennsylvania and work on those sections is now in progress. The necessity of having the deep water channel brought up to the City and the lack of further appropriations by the United States to this end, caused this question to be brought to the attention of the State Legislature and resulted in the Act of Assembly, May 8, 1905, appropriating to this City the sum of \$375,000 for deepening and improving the channel of the Delaware river between the City of Philadelphia and Delaware Bay, contingent on the appropriation of a like amount by the City of Philadelphia, for the same purpose. By ordinance of Councils, October 4, 1905, \$375,000 was appropriated by the City for this purpose, it being further specified in the ordinance that the material dredged from the channel be deposited within the limits of the State of Pennsylvania.

Plans of the work were submitted by his Honor, the Mayor, to the Secretary of War, with the request that the City be allowed to proceed.

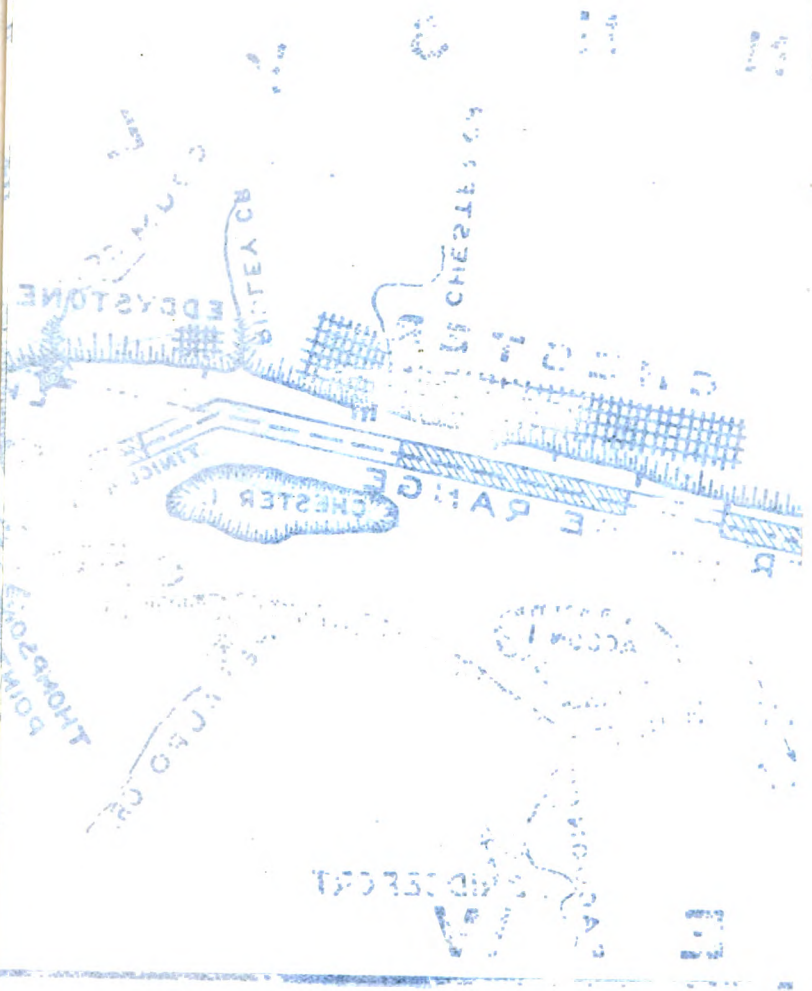
License to this effect was granted by the Secretary of War, October 23, 1905.

The project provides for the formation of a channel 30 feet in depth and 600 feet in width along the range lines established by the Light House Board.

In order to obtain greater competition among bidders, the work was divided into five sections.

Proposals were received on November 24, 1905, from a number of dredging companies, but the matter is being held under advisement.

M





Removal of the Wreck of the Steamship Bermuda.

Work on the removal of this wreck which was started in 1904, and had been shut down during the Winter, on account of the inclemency of the weather was about to be resumed in the early Spring, when it was abandoned by the contractor, Lewis H. Darling. His sureties, the American Surety Company, were notified to proceed with the contract and arrangements were made by them to have the work completed by Messrs. Van Sant and Boehm. Considerable difficulty has been experienced in dredging the site owing to the nature of the wreck and work on the contract is still under way. No payments have been made.

Improvement of Delaware Avenue.

In September, 1903, a license was granted by the Board of Port Wardens to the Baltimore and Ohio Railroad Company to construct a pier 60 feet wide to the pier-head line, together with an enclosing building and a temporary building between Piers 11 and 12 north, on property leased from the City at this locality. The work of construction was started in 1904, and completed during the current year, under the inspection of this bureau.

Improvement of the Channel of the Schuylkill River.

During the years 1895 to 1899, the channel of the Schuylkill river was dredged to a depth of twenty-two (22) feet below the plane of mean low water and a general width of two hundred and fifty (250) feet, from Penrose Ferry bridge, northward to Fifty-eighth street, and to a depth of twenty (20) feet and a general width of one hundred and fifty (150) feet from this point to about 500 feet above Harrison's Wharf. The work was done by the City of Philadelphia under various appropriations to the Bureau of Surveys, amounting in all to \$220,000 to December 31, 1898.

The requirements of navigation then demanded that the depth of the channel be further increased to at least twenty-six (26) feet as far as the northern limit of the oil refinery wharves, to accommodate the increased deep draught of the steamers trading with this port; in response to the agitation of the maritime interests and trades leagues of the City, an appropriation of \$250,000 was made by Councils, by ordinance of July 27, 1901, for the further improvement of the channels of the Delaware and Schuylkill rivers. Of this amount \$110,525.26 was used in dredging the Schuylkill river and the balance devoted to the Delaware river, and the work was performed in the years 1901 and 1902.

The specifications for this contract were so drawn as to require all material dredged from the river to be placed ashore beyond high water and within the limits of League Island Park; the material was so placed by the hydraulic method. The twenty-six feet channel was dredged from deep water near the mouth of the river to a short distance above Penrose Ferry Bridge and was completed to the extent of the appropriation on September 7, 1902. The ordinances of Councils of June 27, 1902, and June 1, 1903, set aside the amount of \$400,000 from the Loan of June 11, 1902, for the further prosecution of the work of harbor improvement. The bids for this work, known as Contract No. 10, were received March 23, 1903, and contract awarded to the American Dredging Company, the lowest bidder. Notice to begin work was given June 15, 1903; time to complete eighteen (18) months.

The work was started June 22, 1903, and completed May 15, 1905. 731,747 cubic yards of material, other than rock or wreckage, and 62 5/10 cubic yards of rock were removed from the channel of the river and placed ashore beyond high water, the former being deposited by the hydraulic

method on League Island Park, both east and west from Broad street.

The work performed under this contract has resulted in the formation of a channel twenty-six (26) feet deep at mean low water and two hundred and fifty (250) feet wide from the terminus of Contract No. 9 about 500 feet above Penrose Ferry bridge, northward to a point about 200 feet below the centre line of Passyunk avenue; a channel twenty (20) feet deep at mean low water through the east spans of the draw-bridges at Gray's Ferry and of a general width of two hundred (200) feet for a distance of about $\frac{4}{10}$ miles, thereby opening to traffic the full width of the channel at this hitherto contracted portion of the river, which also required the dredging out of the ends of two of the old wharves on the easterly side of the river at this locality that extended within the channel line and the construction of a fender rack in front of the shore abutment of the railroad bridge. The final estimate for Contract No. 10 was dated May 16, 1905, and the total amount paid the contractors was \$371,998.50.

During the progress of the surveys incident to the location of the channel, it was discovered that so many of the triangulation stations of the original survey of the river were destroyed and the shore and wharf lines so changed as to make the others practically worthless. It was therefore deemed expedient to make an entire new triangulation of the Schuylkill river from its mouth to Walnut street. The new stations were carefully located, marked by white marble stones 6 inches square and 2 feet long, buried in the ground, each having a countersunk triangle cut in the head surrounding the centre point of the station. This work was carried on during the Fall of 1904 and Winter of 1905.

The actual centre lines of the various reaches of the channel of the river were marked by 1-inch iron pipes, 3 feet

long, buried in the ground and carefully tied into the triangulation and an accurate topographical survey of the river completed.

Levels were also run from the United States Standard at Fort Mifflin and benches were established at convenient distances on both sides of the river from its mouth to Walnut street, being especially marked at the various bridges.

Registry Division.

The work done in the Registry Division is as follows:

Number of certificates of registered owners issued to the public	4,820
Number of certificates issued to the Law Department	742
Number of liens issued to Law Department.....	912
Number of liens issued to Department of Taxes.....	895
Cash paid Tax Receiver for searches	\$1,201 50
Cash paid Tax Receiver from miscellaneous sources	\$336 90
Number of original lots plotted.....	12,811
Number of transfers entered in Plan Books.....	40,541
Number of titles to property corrected.....	2,094
Number of plans made for Departments and Bureaus	264
Number of examinations of Plan Books by the public	60,327
Number of descriptions filed for registry.....	53,352
Number of certificates of legal opening of streets....	2,461
Number of affidavits for opening of streets examined and entered on the records as legally open to public use	89
Number of deeds of dedication, releases, etc., received	178
Number of deeds, etc., recorded.....	171
Amount paid for recording deeds, etc.....	\$463 00
Number of Road Jury plans ordered by Law Department	84
Number of stub books completed.....	1,622
Number of descriptions filed in stub books.....	67,446
Number of current descriptions filed.....	33,828
Number of descriptions filed to December 31, 1904..	643,432
Number of Registry Plan Books renewed.....	30

The tabular statement above conveys but a very inadequate idea of the mass of business transacted with the pub-

lic. The one item of "examination of plan books by the public, 60,327" will indicate that to transact this amount of business, the counters are crowded all day and every day, and also indicates that renewals are imperative, if the convenience of the public is to be served. It taxes the present force to keep up with renewals required.

Increased space for records is needed, as they must be kept in such a way as to be readily accessible.

Historical and Concluding Remarks.

With the rounding out of the first half century of the existence of the Bureau of Surveys, originally created as the Department of Surveys, it would seem pertinent to trace the growth of the department, which growth is an exponent of the City's progress.

The Department was inaugurated in 1855, when the population of the City consisted of about 400,000.

In 1856 the the Board of Surveyors was constituted, consisting of twelve District Surveyors, elected by the people, and one Chief Engineer and Surveyor, elected by Councils.

In 1863 the Department consisted of a Chief Engineer and Surveyor, Recording Clerk, one Draughtsman and a Rodman.

In 1865, the Registry Bureau was organized, under the control of the Chief Engineer and Surveyor, to record all transfers of property, which records were prepared chiefly for the convenience of real estate assessors.

From 1863 to 1876, the Chief Engineer and Surveyor prepared plans for sewer construction, and approved plans for bridge construction, but the work was done under the Commissioner of Highways.

In 1876, the work of constructing main sewers was transferred to the charge of the Department of Surveys, and in 1884 the responsibility for the construction of all

sewers and drains was laid upon that Department. When this responsibility was fully assumed by the Survey Department, after an extensive investigation, a comprehensive plan of procedure was prepared and adopted for modernizing the sewer system of the City, which it has been found necessary at various times since to revise.

Since 1887, when the new City Charter took effect, and the Survey Department was changed to the Bureau of Surveys, in addition to the preparation of plans, estimates and the making of assessments prescribed by various acts and ordinances, the design and the construction of various public works fell upon this Bureau.

The different divisions into which the bureau is divided, each under the charge of its Assistant Engineer; especially fitted for his particular branch, are as follows:

District Surveyors; the Design of Sewers; Construction of Sewers; Bridges; Harbor Improvement; Abolishing Grade Crossings; General Plans and Boulevard Extension; Laboratory of Tests; and the Registry Division. Work in any one of these divisions far exceeds the work performed in the whole Survey Department when originally constituted.

Attention is called to the fact that special work has been performed by the bureau, notably, the construction of the subway on Pennsylvania avenue, the dredging of the channels of the Delaware and Schuylkill rivers, construction of piers along the Delaware river water front, and the improvement of the landing facilities of the port.

Also, at the inception of the work of providing a new and improved water supply for the City of Philadelphia, the work of organizing a force, and the preparation of the preliminary plans devolved upon the Bureau of Surveys, until the magnitude of the work became such as in the judgment of the City's authorities and Councils, to make it

advisable to create a separate Bureau, which was done in July, 1902.

New work of considerable magnitude now under the charge of the bureau, about to be started, comprises the abolishment of grade crossings on the line of Philadelphia and Reading Railroad on Ninth street, between Spring Garden street and Wayne Junction, and on the Richmond Branch of the Philadelphia and Reading Railroad, from Kensington avenue to Richmond street.

The supervision of the plans prior to approval, and the inspection of the construction of the various subways to be built by the Philadelphia Rapid Transit Co., and the passing upon the plans of other large railroad improvements contemplated or under way, are among the duties of this bureau.

All of this work calls for men of the highest grade of technical training in the several branches of the engineering profession, and the bureau is fortunate in having among its employees men who possess these qualifications in a marked degree.

Men of this character are faithful and give their best talent to the solution of problems so as to best serve the City's interests, and it is fitting that recognition be given to this service. The compensation being sometimes less than is paid by private corporations, it has been at times difficult to retain the men in the City's employ.

The Chief Engineer, in addition to the duties which he performs as Chief Engineer and Surveyor, was on June 15, 1905, appointed Acting Chief Engineer of the Bureau of Filtration, which duty he continues to perform. The burden of these additional duties has been considerably lightened by the conscientious service of the assistants in the Bureau of Surveys.

I desire to recognize the cordial relations which have ex-

isted between the Director of the Department of Public Works and the bureau employees in the conduct of the large volume of business transacted between the two offices, and to express my appreciation of the support which he has given to the Chief of this bureau in the management of its affairs.

Tables showing the detailed work and report of the bureau are submitted.

Yours respectfully,

G. S. WEBSTER,

Chief Engineer.

Bureau of Surveys. Appropriations for 1905. Balance Sheet.

Item	Appropriations, Balances and Transfers.	Available Appropriations.	Expended.	Balance Merging.	Balance not Merging.
1	For salaries, general office, registry bureau and engineer corps..... Transferred from, August 1, 1905..... \$27 50 Transferred from, November 16, 1905..... 348 34 Transferred from, December 28, 1905..... 500 00 <hr/> 1,065 84				
		\$69,594 16	\$69,279 20	\$314 96	
2	For renewing plans and descriptions in registry bureau	3,600 00	3,600 00		
3	For cleansing office, carriage hire, advertising and incidentals..... Transferred to, August 1, 1905..... <hr/> 1,200 00 217 50				
	For recording deeds of dedication.....	1,417 50	1,417 50	37 00	
		500 00	463 00		
4	For salaries and expenses of district surveyor: For salaries of fourteen district surveyors..... For wages of employees, expenses, rent and horse-keep..... Balance, Item 4, 1904..... <hr/> 42,000 00 138,000 00 4,863 70				
		184,863 70	182,131 15	932 55	\$1,800 00
5	For examination of bridges and sewers	500 00	496 68	3 32	
6	For carriage hire and keep of horses for chief and assistant engineers		1,200 00		
7	For expenses Board of Harbor Commissioners, including salary of secretary attending the preparation of plans of port of Philadelphia.....		300 00	300 00	
8	For repairs, reconstruction and improvement of old sewers, and for the construction of manholes, ventilators and inlets for the same..... Balance, Item 8, 1904..... <hr/> 15,000 00 7,616 64				
		22,616 64	22,613 37	3 27	

Bureau of Surveys. Appropriations for 1905. Balance Sheet.—Continued.

Item.	Appropriations, Balances and Transfers.	Available Appropriations.	Expended.	Balance Merging.	Balance not Merging.	
9	For the reconstruction of inlets		\$5 000 00	\$4,109 99	\$890 01	
10	For the construction of branch sewers and inlets and the payment of bills of assessment against City property	\$175,000 00				
	Balance, Item 10, 1904	64,845 46				
	Additional appropriation, June 14, 1905	25,000 00				
	Transferred to, August 1, 1905	28,043 41				
	Transferred to, November 20, 1905	1,058 86				
			293,947 73	233,626 04	2,028 54	\$58,293 15
11	For the maintenance of pumping station at Mingo Creek	3,000 00				
	Transferred to, November 16, 1905	1,000 00				
			4,000 00	3,787 06	212 94	
12	For cornerstones and replacing landmarks		5.0 00	500 00		
13	For engraving and printing maps of the City		200 00	199 90	10	
14	For Cohocksink relief sewer	50,000 00				
	Balance, Item 15, 1904	16,149 42				
	Additional appropriation, May 9, 1905	8,000 00				
		\$74,149 42				
	Transferred from, November 16, 1905	104 98				
			74,044 44	48,363 50		25,680 94
15	For the construction of branch sewers, loan, June 27, 1904. Balance, Item 10½, 1904		57,943 55	56,382 88		1,560 67
16	For the construction of main sewers, loan, June 27, 1904. Balance, Item 24½, 1904		637,089 34	384,922 15		252,167 19
17	For the construction of new bridg's. Balance, Item 17, 1904		15,512 34	15,501 49	10 85	

Bureau of Surveys. Appropriations for 1905. Balance Sheet.—Continued.

Item.	Appropriations, Balances and Transfers.	Available Appropriations.	Expended.	Balance Merging.	Balance not Merging.
18	For the construction of new bridges, loan, June 27, 1904. Balance, Item 21½, 1904.....		\$993,664 02	\$201,581 68	\$792,082 34
19	For the construction of Market street sewer. Balance, Item 19, 1904..... Transferred from, August 1, 1905.....	\$100,000 00 100,000 00			
20	For removing wreck of steamship Bermuda from the Delaware River. Balance, Item 14, 1904.....		6,700 00		6,700 00
21	For the construction of new bridges, loan, June 17, 1898. Balance, Item 21, 1904.....		4,651 51	4,651 51	
22	For dredging Delaware and Schuylkill Rivers, loan, June 11, 1902. Balance, Item 22, 1904.....		113,877 86	111,994 47	1,883 39
23	For dredging Delaware and Schuylkill Rivers. Balance, Item 31, 1904..... Additional appropriation, May 10, 1905.....	4,216 25 3,000 00	7,216 25	5,416 25	1,800 00
24	For abolishing grade crossings on the line of the Philadelphia and Trenton Railroad, loan, June 17, 1898. Balance, Item 27, 1904.....		690,889 22		690,889 22
25	For abolishing grade crossings on Pennsylvania avenue and Noble street, loan, March 15, 1894. Balance, Item 25, 1904.....		682 47		682 47
26	For widening Delaware avenue, extending wharves, altering sewers, etc., and for costs and damages, loan, January 13, 1896. Balance, Item 26, 1904.....		35,907 97	1,761 34	34,146 63

Bureau of Surveys. Appropriations for 1905. Balance Sheet.—Continued.

Item.		Appropriations, Balances and Transfers.	Available Appropriations.	Expended.	Balance Merging.	Balance not Merging.
27	For deepening and improving channel of Delaware River between City of Philadelphia and Delaware Bay.					
	Appropriated by temporary loan, Oct. 4, 1905. . . .	\$375,000 00	.			
	Appropriated from State funds, Ord. Dec. 27, 1905.	375 000 00	\$750,000 00			\$750,000 00
28	For payment bill, estate of John Morrison, for repairing break in sewer, 38th street above Brown street, ordinance, November 16, 1905.		504 04	\$504 04		
	Total		\$3,986,012 74	\$1,354,893 20	\$4,433 54	\$2,626,686 00

Recapitulation.

Appropriation for 1905	\$506,660 00
Balance available from 1904	2,763,609 75
Additional appropriations and transfers	816,913 81
	<hr/>
	\$4,087,183 56
Transfers from	101,170 82
	<hr/>
	\$3,986,012 74
Amount expended	1,354,893 20
Amount merged	4,433 54
Balance carried forward to 1906	2,626,686 00
	<hr/>
	\$3,986,012 74

Receipts of the Bureau of Surveys (except District Surveyors) for the year 1905.

	Sewer Permits.	Sewer Assessment Bills.	Balances of Accounts.	Searches.	Miscellaneous.	Total.
January.....	\$97 00	\$1,178 07	.....	\$64 75	\$8 85	\$1,348 67
February.....	111 00	359 62	\$2 82	67 75	22 50	563 19
March.....	616 25	382 65	.....	99 25	44 00	1,142 15
April.....	1,473 00	438 75	12 68	118 75	37 70	2,080 88
May.....	1,696 00	3,174 70	21 51	125 50	55 55	5,073 26
June.....	1,841 25	3,939 52	6 86	115 25	23 70	5,926 58
July.....	1,851 25	1,888 11	103 59	94 75	36 90	3,924 60
August.....	2,721 50	1,204 56	37 55	99 00	24 20	4,086 81
September.....	1,925 85	438 50	.....	101 75	32 00	2,493 10
October.....	1,512 50	1,222 43	50 15	123 50	12 50	2,921 08
November.....	1,966 35	1,926 58	30 50	90 00	16 50	4,029 93
December.....	726 85	1,244 95	.....	101 25	22 50	2,095 55
Total.....	\$16,533 80	\$17,343 44	\$265 16	\$1,201 50	\$336 90	\$35,685 80

Main Sewers.

MAIN SEWERS COMPLETED.	LENGTH.		COST OF CONSTRUCTION.			
	Feet.	Miles.	Assessment Bills.	PAID BY CITY.		Total Cost.
				Warrants.	Inspection.	
Mains completed prior to 1855	95,040	18.00				
Mains completed 1855 to 1868	27,456	5.20				\$294,588 88
Mains completed 1868	3,226	0.61	\$3,758 21	\$6,528 99		10,287 20
Mains completed 1 60	18,334	3.48	33,943 02	146,468 96		182,351 88
Mains completed 1870	5,422	1.08	11,381 67	214,321 35		225,708 02
Mains completed 1871	7,327	1.38	15,242 86	294,114 66		309,357 52
Mains completed 1872	1,570	0.30	2,406 08	213,067 75		215,473 83
Mains completed 1873	7,655	1.46				86,946 75
Mains completed 1874	3,035	1.69				146,334 94
Mains completed 1875	5,365	1.02	6,061 99	134,606 94		140,668 93
Mains completed 1876	9,714	1.84	4,486 67	486,879 27		491,365 94
Mains completed 1877	17,491	3.31	39,744 33	291,568 35	\$6,886 83	335,219 01
Mains completed 1878	20,342	3.85	37,787 92	188,321 95	5,123 31	231,233 18
Mains completed 1879	5,250	0.99	10,152 02	50,736 84		60,888 86
Mains completed 1880	2,368	0.45	4,178 75	52,579 50	151 62	56,909 87
Mains completed 1881	1,961	0.37	2,939 60	40,389 94	927 51	44,257 05

365

Main Sewers—Continued.

MAIN SEWERS COMPLETED.	LENGTH.		COST OF CONSTRUCTION.			
	Feet.	Miles.	Assessment Bills.	PAID BY CITY.		Total Cost.
				Warrants.	Inspection.	
Mains completed 1882.....	2,614	0.50	\$5,804 80	\$17,842 20	.....	\$23,646 50
Mains completed 1883.....	4,286	0.92	5,332 51	128,614 98	\$1,346 65	135,204 14
Mains completed 1884.....	21,359	4.05	12,489 14	205,323 38	.....	217,762 52
Mains completed 1885.....	12,552	2.38	7,784 65	127,502 03	.....	135,286 68
Mains completed 1886.....	18,518	3.51	12,516 25	193,277 50	.....	205,793 84
Mains completed 1887.....	13,750	2.60	3,462 65	232,290 45	.....	235,753 10
Mains completed 1888.....	14,705	2.79	10,394 30	205,526 12	.....	215,920 42
Mains completed 1889.....	25,640	4.86	12,375 97	324,565 58	10,764 94	345,206 40
Mains completed 1890.....	29,569	5.59	8,328 93	650,325 29	11,923 26	670,577 48
Mains completed 1891.....	36,102	6.84	5,592 13	594,375 42	10,356 28	610,323 83
Mains completed 1892.....	45,125	8.55	12,635 95	537,374 40	12,790 28	562,800 63
Mains completed 1893.....	76,715	14.53	18,263 26	1,151,665 67	18,416 65	1,188,345 78
Mains completed 1894.....	102,290	19.37	1,345 72	1,434,497 79	26,600 92	1,462,453 43
Mains completed 1895.....	48,793	9.23	18,528 72	323,701 53	14,803 28	362,033 53
Mains completed 1896.....	18,661	3.53	17,849 84	137,232 72	5,313 32	160,395 88

Main Sewers—Continued.

MAIN SEWERS COMPLETED.	LENGTH.		COST OF CONSTRUCTION.			
	Feet.	Miles.	Assessment Bills	PAID BY CITY		Total Cost.
				Warrants.	Inspection	
Main sewers completed, 1807.....	413	.07	.....	\$2,329 82	\$200 00	\$2,529 82
Main sewers completed, 1808.....	6,180	1.18	.....	49,176 70	.....	49,176 70
Main sewers completed, 1809.....	14,458	2.74	\$5,268 68	119,592 34	8,696 66	128,552 68
Main sewers completed, 1800.....	26,626	5.04	18,625 02	468,822 09	14,919 95	497,867 06
Main sewers completed, 1801.....	21,929	4.15	1,291 72	547,185 99	17,545 82	566,028 58
Main sewers completed, 1802.....	25,302	4.79	1,752 25	688,360 50	17,606 58	652,719 38
Main sewers completed, 1803.....	43,431	8.23	.....	1,006,479 38	22,386 50	1,028,665 88
Main sewers completed, 1804.....	13,316	2.52	.....	354,161 59	11,157 26	365,318 86
Main sewers completed, 1805.....	23,287	4.41	7,198 27	435,143 98	16,373 22	458,720 47
Total.....	883,577	167.34	\$353,070 83	\$12,007,436 64	\$226,299 34	\$13,068,076 33

Length and Cost of Main Sewers Built During the Year 1905.

Location.	Size.	LENGTH IN FEET.		Cost per Foot.	PAYMENT.		Total Cost.	Contractors.	Inspectors.	
		Prior to 1905.	In 1905.		In Assessment Bills.	In City Warrants.				
Castor road, from northeast of Harrison street to Pratt street, in Pratt street to Summerdale street, and in Summerdale street to Sanger street.	6 feet.....		409 10	\$14 39			\$22,944 09	} Final estimate is pending. }	} M. J. Hogan & Company }	} B. H. Foulkrod. D. Walsh. }
	5 feet 9 inches.....		549 20	10 70						
	5 feet 3 inches.....		551 30	9 77						
	4 feet 9 inches.....		21 70	20 44						
	3 feet 9 inches.....		785 60	4 86						
	3 ft. by 2 ft.....		527 10	2 89						
	18 in. t. c. pipe.....	1,196 50	3 11							
	15 in. t. c. pipe.....	459 70	1 83							
3 Junc. chambers.....			Lump sum							
			66 00	1,328 00						
Cohocksink sewer relief and reconstruction in Girard avenue from Mascher street to Front street and in Front street from Girard avenue to near Wildey street.....	8 feet 3 inches.....		41 05	\$32 20			35,127 17	} \$35,127 17 }	} J. H. Louchheim. }	} W. E. Haley. T. MacElwee. }
	10 ft. by 6 ft. 6 in.....		694 05	29 70						
	2 special sections.....		64 00	Lump sum 2,400 00						
Cohocksink sewer reconstruction and relief in Montgomery avenue from the east side of Marshall street to 24 feet east of the east side of Ninth street.....	10 feet enlarged from 9 feet diameter.....	880 00		By items.....			16,044 44	} 49,895 02 }	} Robert Higgins. }	} J. Vicary. }
	13 feet.....		647 00	By items.....			32,319 06	} Work is in progress. }	} J. H. Louchheim. }	} J. Vicary. }

Length and Cost of Main Sewers Built During the Year 1905—Continued.

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Location.	Size.	LENGTH IN FEET.		Cost per Foot.	PAYMENT.		Total Cost.	Contractors.	Inspectors.
		Prior to 1905.	In 1905.		In Assessment Bills.	In City Warrants.			
Eastwick avenue from Sixty-fourth street to Sixtieth street, and in Sixtieth street from Eastwick to Gibson avenues	{ 4 feet 6 inches	217 00	89 98	}	\$14,029 74	\$23,029 74	Robert Higgins.	Thomas Mac-Elwee.
	{ 4 feet 6 inches	580 00	.....	9 15				
	{ 4 feet 6 inches	1,908 00	200 00	6 97					
	{ 3 feet 9 inches	12 50	.....	8 79				
Frankford intercepting sewer system in Wakelin street, from north of Tacony street to Ditman street.	{ 11 feet 6 inches by	79 00	751 00	43 62	}	27,304 80	{ Work is in progress.	} Robert Higgins	G. W. Myers
	{ 10 feet 6 inches	.....	.....	.....		
Indian run sewer, branch in Lebanon avenue, from Indian Run near Sixty-ninth street to east of Sixty-seventh street	{ 5 feet	225 00	11 06	}	4,320 00	\$12,000 00	Robert Higgins.	J. Hare.
	{ 5 feet	175 00	.....	10 32				
	{ 4 feet	365 00	197 00	8 79					
	{ 4 feet	375 00	121 00	5 56					
Jackson street, from 354 feet west of Schuylkill avenue to Thirty-sixth street	{ 7 feet 6 inches	298 4	20 64	}	19,860 37	19,860 37	Sweeten and Hanlon.	E. H. Sickels. J. Barlow. J. D. Henderson.
	{ 7 feet 6 inches .....	.....	543 13	17 70				
Magee street sewer extension, from west of Delaware avenue to a point near the Bulkhead line, and from Milnor street to Torresdale avenue..	{ 9 feet 6 inches	136 56	49 00	}	37,576 00	{ Work is in progress.	} David Peoples.	J. W. Harmer
	{ 8 feet 9 inches .....	.....	955 00	24 00				
	{ 8 feet 6 inches .....	.....	680 00	20 00				
McKean street, from Twelfth street to Broad street.....	{ 7 feet	225 00	244 83	20 32	}	19,853 76	\$23,253 76	H. E. Ruch.....	J. Hunter.
	{ 6 feet	636 64	19 70					
	{ Junc. chamber	16 00	Lump sum 450 00					

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Length and Cost of Main Sewers Built During the Year 1905—Continued.

Location.	Size.	LENGTH IN FEET.		Cost per Foot.	PAYMENT.		Total Cost.	Contractors.	Inspectors.
		Prior to 1905.	In 1905.		In Assessment Bills.	In City Warrants.			
Ninth street, from Courtland street to Wyoming avenue, in Wyoming ave. to Eleventh street, in Eleventh street to Loudon street, and in Loudon street to Twelfth street.....	5 feet 6 inches	429	70	\$11 02	}	\$17,068 80	} Final estimate is pending.	} M. J. Hogan & Company...	} T. D. Hooper.
	5 feet 6 inches	94	20	13 20					
	5 feet	426	10	9 90					
	4 feet 9 inches	388	60	6 98					
	4 feet 9 inches	63	00	8 05					
	4 feet 6 inches	980	30	6 85					
Pratt street sewer extension, from terminus near Leiper street to Saul street, thence in Saul street to Foust street, in Foust street to Oakland street, and east in Oakland street to stream.....	12 feet.....	164	00	\$33 70	}	} 26,515 20	} Work is in progress.	} David M. McMahon.	} P. D. Brown.
	12 feet 9 inches	716	00	33 70					
	8 feet.....	40	00	33 70					
	One Junction chamber.....	34	14	2,400 00					
Rock Run sewer in Ashdale street, from the P. N. and N. Y. R. R. to Fifth street.....	13 feet.....	25	03	29 90	}	} 31,000 00	} Work is in progress.	} David M. McMahon.	} J. McCormick
	13 feet.....	142	00	23 50					
	13 feet.....	582	00	34 90					
	12 feet 6 inches	601	00	23 40					
Rock Run sewer in Duncannon street, from stream at K. and O. turnpike to "A" street, in "A" street to Fisher avenue, in Fisher avenue to Ella street, and in Ella street to Tabor road.....	4 feet.....	226	00	8 38	}	} 14,059 39	} \$14,059 39	} Henderson and Co., Ltd.	} F. D. Morris.
	4 feet.....	385	00	9 74					
	4 feet.....	683	41	7 33					

Length and Cost of Main Sewers Built During the Year 1905—Continued.

Location.	Size.	LENGTH IN FEET.		Cost per Foot.	PAYMENT.		Total Cost.	Contractors.	Inspectors.
		Prior to 1905.	In 1905.		In Assessment Bills.	In City Warrants.			
Repairs, reconstruction and improvement of old sewers, etc. under general contract for 1904, in Thompson street, from east to west of Lawrence street and upon other streets.....	{ 11 feet enlarged from 10 feet.	110 70	{ By items.	\$7,613 52	\$18,114 88	J. H. Louchheim.	J. Vicary.
Repairing, reconstruction and improvement of old sewers, etc., under general contract for 1905.....	.....	.....	.....	.....	.....	.....
a. Thompson street, from west of Lawrence street to east of Fifth st.	{ 11 feet enlarged from 10 ft. diameter.	118 00	{ By items.	5,100 96	} 14,999 85	David Peoples ...	P. D. Brown.
b. Ninth and Tasker streets, well-hole and connections.....	{ 3 feet 6 inches.	.....	19 33 vert. feet.	{ By items.	.....	340 74	
c. Rectification of channel of Frankford creek at Powder Mill lane.....	{ .....	.....	.....	{ By items.	.....	238 90
d. Reconstruction of Mascher street branch of Cohocksink sewer on Mascher street, from Thompson street northward.....	{ 7 feet 6 inches by 6 feet 6 inches.	.....	309 00	{ By items.	.....	9,319 25	

Length and Cost of Main Sewers Built During the Year 1905—Continued.

Location.	Size.	LENGTH IN FEET.		Cost per Foot.	PAYMENT.		Total Cost.	Contractors.	Inspectors.
		Prior to 1906.	In 1905.		In Assessment Bills.	In City Warrants.			
Shunk street sewer system in Porter street, from Stone House lane to Moyamensing avenue.....	6 feet 6 inches.....		300 82	\$22 00	} \$7,198 27	} \$43,450 65	} \$68,792 92	} David Peoples...	} P. D. Brown.
	6 feet.....	151 00	76 00	17 00					
	6 feet.....	1,119 00		15 75					
	5 feet 6 inches.....		883 20	14 00					
	5 feet.....		446 00	11 40					
	4 feet 6 inches.....		446 00	10 00					
Sixtieth street, from Cobb's Creek to Trinity street, in Trinity street to Fifty-ninth street, and in Fifty-ninth street to Chester avenue.....	4 feet 6 inches.....	810 00	80 50	9 67	}	} 7,525 54	} 17,700 54	} McCormick & Co.	} C. E. Preston.
	4 feet 6 inches.....	1,150 00	378 97	8 47					
	5 feet by 3 feet 4 inches.....	256 00	608 00	13 36					
	4 feet by 2 feet 8 inches.....		467 50	12 02					
Twelfth street, from Lombard to Locust streets.....	Junc. chamber.....	10 00		Lump sum 750 00	}	} 14,681 01	} 18,000 01	} Rob't Lombardi.	} C. A. Crossin.
Wingohocking creek sewer on Annsbury street, from near Sixth street to the North Pennsylvania R. R.....	17 feet 3 inches Special section.....	150 00	80 00	58 90	}	} 10,176 00	} 15,040 00	} David Peoples.....	} J. M. Hipple.
Wissahickon High Level, cut off sewer in Twenty-fourth street and through private property, along the line of Twenty-fourth street extended, from Indiana street to the P. G. & N. R. R.....	6 feet.....		125 00	26 00	}	} 18,670 63	} Work is in progress.	} T. H. Bowman...	} { E. H. Sickels J. J. Mac- Velgh. W. Manser. D. Walsh.
	6 feet.....		554 00	29 00					

General Statement of Work Done by District Surveyors During the Year 1905.

District.	Surveyor and Regulator.	Lots Surveyed. Number of.	Curb Regulations. Linear Feet.	Grade Regulations. Linear Feet.	New Paving. Square Yards.	Repaving. Square Yards.	Macadam. Square Yards.	Footway Paving and Repaving. Square Yards.	Street Lines and Grades Projected. Acres.	Street Lines and Grades Revised. Acres.	Topographical Surveys, Acres.	Farm Land Surveyed, Acres	Estimates of Projected Work Prepared.	Grading Measured, Cubic Yards.
1	John M. Nobre.....	070	33,544	143,041	13,868	46,885	.....	1,330	2	1,050	14	41	174	7,312
2	Charles W. Close...	472	16,205	575	9,523	6,017	.....	.....	9	11	.....	21	49	598
3	W. C. Cranmer.....	540	17,338	135,238	.....	16,115	.....	983	1	12	.....	.....	16	.....
4	Fritz Bloch.....	220	4,943	26,300	3,745	48,598	.....	2,789	.....	36	.....	.....	3	225
5	Walter Brinton.....	2,075	24,280	107,011	15,305	.....	.....	.....	.....	.....	.....	170	93	140,080
6	Joseph Mercer.....	950	34,685	78,403	27,124	32,605	500	23,972	40	22	.....	.....	124	42,204
7	W. K. Carlile.....	228	9,510	41,558	6,379	50,146	.....	6,038	.....	.....	.....	.....	6	20,555
8	C. A. Sundstrom ..	223	6,508	2,889	4,645	9,073	.....	.....	.....	440	.....	65	80	7,341
9	Joseph C. Wagner..	1,373	18,184	96,240	7,313	3,105	19,768	73	.....	892	.....	.....	135	106,176
10	John H. Webster, Jr.	675	15,306	75,621	7,173	2,784	.....	6,613	.....	300	.....	99	64	43,977
11	Joseph Johnson....	1,740	40,225	86,783	31,777	65,876	18,147	484	.....	.....	.....	81	147	175,770
12	J. H. Gillingham...	3,100	69,764	122,506	85,121	11,951	2,299	.....	.....	116	.....	.....	242	187,604
13	H. M. Fuller.....	541	16,068	42,514	17,567	2,534	.....	.....	.....	20	.....	36	72	17,210
14	C. B. Webster.....	75	5,598	66,180	.....	.....	20,699	.....	.....	342	2,015	284	9	100,804
	Total.....	13,710	312,248	975,858	229,540	295,934	61,378	42,282	52	3,250	2,020	797	1,164	850,556

General Statement of Work Done by District Surveyors During the Year 1905.—Continued.

District.	Surveyor and Regulator.	Railroad Track Laid—Linear Feet.	Crossing Stone Measured—Linear Feet.	Gutter Measured. Stone, Vitrified Brick and Iron—Linear Feet.	Water Pipe, Measured—Linear Feet.	Sewer Measured—Linear Feet.	Railway Plans Prepared.	Jury Plans Prepared.	Plans Prepared for Highway and Survey Committees of Council.	Plans of Streets to be Placed Upon City Plan.	Plans of Streets to be Paved or Repaved.	Plans Showing Laterals from Sewer to Curb.	Miscellaneous Plans Repaired.
1	John M. Nobre	9,050	721	.....	6,458	8,846	8	9	7	5	12	26	164
2	Charles W. Close		81	.....	2,558	11,425	.....	1	8	27	27	11	.....
3	W. C. Cranmer	37,740	575	2,944	875	4,201	1	14	1	7	12	.....	37
4	Fritz Bloch	13,498	16	801	1,530	1,739	10	.....	.....	3	1	.....	29
5	Walter Brinton				17,259	24,038	2	15	13	6	12	2	.....
6	Joseph Mercer		5,085		11,808	19,728	8	5	.....	61	10	42	.....
7	W. K. Carlile	16,655	133	1,000	.....	3,503	10	1	28	26	.....	.....	145
8	C. A. Sundstrom				2,494	1,523	1	5	.....	2	3	4	.....
9	Joseph C. Wagner				5,074	11,812	.....	9	91	8	9	.....	289
10	John H. Webster, Jr.	1,080			5,041	13,823	.....	10	5	8	6	5	227
11	Joseph Johnson	48,950	12	.....	4,967	21,126	1	4	.....	2	13	36	66
12	J. H. Gillingham				35,086	53,297	2	15	24	23	43	75	185
13	H. M. Fuller		527	.....	2,548	7,948	3	2	5	8	19	.....	.....
14	C. B. Webster			2,418	4,026	3,458	1	5	4	5	.....	.....	252
	Total	126,942	7,150	7,253	89,224	186,562	42	95	186	196	167	201	1,304

Branch Sewers.

BRANCH SEWERS COMPLETED.	LENGTH.		COST OF CONSTRUCTION, NOT INCLUDING INLETS SPECIALLY ORDERED.			
	Feet.	Miles.	Assessment Bills.	PAID BY CITY.		Total Cost
				Warrants.	Inspection.	
Branch sewers built prior to 1855.....	103,000	19.50				
Branch sewers built 1855 to 1867.....	92,852	17.57				\$180,250 43
Branch sewers built 1867.....	33,946	6.43	\$62,927 84	\$9,384 00		72,311 84
Branch sewers built 1868.....	32,667	6.19	62,500 21	13,112 87		75,682 08
Branch sewers built 1869.....	49,508	9.39	116,447 61	10,869 96		136,317 57
Branch sewers built 1870.....	57,000	10.81	137,600 04	27,013 34		164,613 88
Branch sewers built 1871.....	49,829	9.44	100,505 50	9,049 97		118,555 56
Branch sewers built 1872.....	45,763	8.67	102,566 11	12,310 37		114,876 48
Branch sewers built 1873.....	60,800	13.22	152,830 14	27,866 12		180,696 26
Branch sewers built 1874.....	59,936	11.35	136,144 74	16,788 55		152,933 29
Branch sewers built 1875.....	77,977	14.77	179,432 85	6,680 41		186,113 26
Branch sewers built 1876.....	43,560	8.25	98,133 03	11,203 96		109,336 99
Branch sewers built 1877.....	28,932	5.48	59,390 64	5,422 40		64,813 04
Branch sewers built 1878.....	32,104	6.08	70,949 88			67,376 90
Branch sewers built 1879.....	17,614	3.34	35,875 96	1,004 02		86,879 98

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Branch Sewers.—Continued.

BRANCH SEWERS.	LENGTH.		COST OF CONSTRUCTION, NOT INCLUDING INLETS SPECIALLY ORDERED.			Total Cost.
	Feet.	Miles.	Assessment Bills.	PAID BY CITY.		
				Warrants.	Inspection.	
Branch sewers built 1880.....	17,641	3.34	\$38,826 09			\$32,169 90
Branch sewers built 1881.....	33,824	6.46	75,231 29			70,091 62
Branch sewers built 1882.....	25,556	4.84	58,528 86	\$8,325 26		66,854 12
Branch sewers built 1883.....	40,385	7.65	91,588 02	38,900 81		130,488 83
Branch sewers built 1884.....	62,276	11.79	109,049 87	40,278 76		149,328 63
Branch sewers built 1885.....	79,154	14.00	149,358 27	25,760 67	\$9,396 45	184,515 89
Branch sewers built 1886.....	113,300	21.46	181,036 87	68,943 60	15,236 28	265,216 75
Branch sewers built 1887.....	101,999	19.32	173,530 34	65,630 48	16,454 19	255,674 01
Branch sewers built 1888.....	159, 90	30.28	329,561 93	148,767 40	20,221 62	498,558 95
Branch sewers built 1889.....	162,937	30.60	309,272 00	99,104 95	24,037 87	432,414 91
Branch sewers built 1890.....	143,583	27.19	239,537 65	97,290 77	22,269 28	359,097 70
Branch sewers built 1891.....	156,681	29.67	254,066 04	98,077 47	24,285 99	376,429 50
Branch sewers built 1892.....	132,000	25.00	251,728 24	102,026 26	19,678 05	373,427 55
Branch sewers built 1893.....	232,863	44.10	465,848 44	333,565 27	33,880 63	833,303 33
Branch sewers built 1894.....	332,220	62.92	651,286 40	435,280 09	54,926 00	1,141,492 49

Branch Sewers.—Continued.

BRANCH SEWERS COMPLETED.	LENGTH.		COST OF CONSTRUCTION, NOT INCLUDING INLETS SPECIALLY CONSTRUCTED.			
			Assessment Bills.	PAID BY CITY.		Total Cost.
	Feet.	Miles.		Warrants.	Inspection.	
Branch sewers built 1895.....	224,625	42.55	\$368,819 68	\$192,369 18	\$58,639 12	\$620,827 98
Branch sewers built 1896.....	116,683	22.09	347,515 35	125,097 50	51,675 57	525,188 51
Branch sewers built 1897.....	133,080	25.20	212,933 31	136,847 08	36,882 52	386,662 91
Branch sewers built 1898.....	114,102	21.61	203,610 31	187,953 24	88,116 06	429,679 61
Branch sewers built 1899.....	176,013	33.33	277,980 80	266,281 35	46,082 92	500,295 16
Branch sewers built 1900.....	186,238	35.27	288,110 98	251,476 06	44,506 04	584,183 08
Branch sewers built 1901.....	121,373	22.99	207,160 05	149,091 62	37,226 27	393,486 94
Branch sewers built 1902.....	110,630	20.95	201,441 27	131,279 26	37,099 59	369,790 12
Branch sewers built 1903.....	82,589	15.64	144,218 33	167,760 33	26,556 38	338,535 04
Branch sewers built 1904.....	113,514	21.50	203,915 16	186,655 23	32,079 45	423,549 84
Branch sewers built 1905.....	103,370	19.57	179,460 96	224,461 99	33,996 22	437,919 17
Total.....	4,070,343	770.89	\$7,353,030 23	\$3,741,839 13	\$670,153 50	\$11,947,882 55

N. B.—The amount paid in City warrants includes inspection, unless otherwise stated. This table does not include Branch Sewers, 2.87 miles in length, built during the years 1897, 1898 and 1899 in connection with Pennsylvania avenue sub-way and Delaware avenue widening.

Summarized Statement of Branch Sewers Built During the year 1905.

Feet.	Miles.	BRICK AND STONE INLETS.		MAN-HOLES	WELL-HOLES.	CURVED GRANITE CURB.	LATERAL HOUSE CONNECTIONS.	REPAV-ING.	PAYMENTS.		INSPEC-TION.	Total Cost of Branch Sewers.	Excess Bills and Balances.
		Size.	Number Built.						In Assessment Bills.	In City War-rants.			
103,370. 22	19. 577	No. 1	4	712	323. 04	8071. 75	54 713	279. 5	\$179,460. 06	\$224,461. 09	\$33,996. 22	\$437,919. 17	\$33,526. 14
		No. 2	85										
		No. 3	182										
		No. 4	38										

Inlets rebuilt..... 15
 Straight cut granite curb..... 758.6 feet
 Curb reset..... 309.74 feet
 Additional Excavation..... 2400.49 cubic yards
 Rubble Masonry..... 4407. 04 cubic yards

Brick Masonry 24.35 cubic yards
 Concrete 554.25 cubic yards
 Manhole Buckets..... 11
 Yellow Pine Platform..... 6300 feet B. M.
 Lowering 48 feet of 16-inch Cast Iron Pipe at
 Cresson Street Sewer..... \$20.00

Statement of Inlets Built with and without Grate Tops, Inlets Rebuilt, Removed and Rebuilt at Other Places, Curved Granite Curb, Sewer Spurs, Masonry, etc., in Connection with Old Sewers, During the Year 1905.

INLETS.			MANHOLES.		GRANITE CURB.		LATERAL CONNECTIONS.		6, 8, 12, 15 AND 18-INCH T. C. PIPE.		SEWER SPURS.			BRICK MASONRY ETC.
Form.	No. Built and Rebuilt.	Cost.	No. Built.	Cost.	No. Feet.	Cost.	No. Feet.	Cost.	No. Feet.	Cost.	Size.	No. Feet.	Cost.	Cost.
<i>New Inlets.</i>														
Solid cast iron cover No. 1.	4	\$340 00	4	\$180 00	Curved	Curb.	14,688	\$9,687 15	262	\$367 86	2 ft. 3 ins. × 1 ft. 6 in.	97	\$145 50	\$488 50
Solid cast iron cover No. 2.	39	2,885 00			1,853 03	\$3,866 85								
Solid cast iron cover No. 3.	40	2,755 00									2 ft. 6 ins. × 1 ft. 8 in.	165	264 00	
Solid cast iron cover No. 4.	13	492 50												
Iron grate cover No. 2.....	13	966 00												
Iron grate cover No. 3.....	29	2,027 00												
Iron grate cover No. 4.....	9	348 00			Straight	Curb.								
					194 61	849 21								
<i>Old Inlets.</i>														
Inlets rebuilt.....	57	2,082 86												
Inlets only grated.....	7	70 00												
Total.....	211	\$11,006 86	4	\$180 00	2,047 64	\$4,216 06	14,688	\$9,687 15	262	\$367 86	.....	262	\$409 50	\$488 50

Total cost for the above work \$27,210 52
 Cost of inspection included in Branch Sewer Account.

Length and Cost of Branch Sewers Built during the Year 1905.

Location.	Size.	Length in feet.	INLETS.		MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No built.	Per foot.		Total cost.	In assessment bills.	In City warrants.					Total cost.
Arch street, from Vogdes street to Fifty-fourth street, and in Fifty-fourth st. from Arch st. to Market st....	3 ft. 3 in. circ.....	156.	3	8	\$75 00	6	\$35 00	c. c. 104.	\$2 00	\$208 00	\$3 25	\$3,391 26	\$340 14	\$4,231 40	Thos. Meeley..	Fred. Wilkins, Sr	Apr. 4
	3 ft. 6 in. x 2 ft. 4 in.	660.						h. c. 888.	50	444 00	1 00						
	3 ft. x 2 ft.....	38.									1 75						
	2 ft. 3 in. x 1 ft. 6 in.	552.									1 65						
	12 in. v. p.....	14.									1 00						
Agate st, from Allegheny ave. to Ann street	3 ft. x 2 ft.....	1,661.				12	35 00	excavation 186.	50	98 00	1 08	4,273 35	508 63	4,871 98	John Doyle....	Mich'l O'Rourke	June 1
	12 in. v. p.....	2.						concrete 176.	5 50	968 00	1 00						
Albert st., from Sepviva st. to Trenton ave....)	3 ft. x 2 ft.....	221.				2	50 00	Y. P. p'lt' m 2,505.	40 00	100 20					R. W. Fleming.	David Peoples...	June 6
	12 in. v. p.....	17.						h. c. 120.	60	77 40	1 80	442 42	150 78	503 20			
Albert st., from Cedar street to Memphis street)	3 ft. x 2 ft.....	371.	3	2	75 00	3	50 00	c. c. 16.5	2 25	37 13	1 58	915 76	213 55	1,129 31	Eugene Emery	David Peoples..	Oct. 2
	12 in. v. p.....	17.						h. c. 315.	60	189 00	1 00						

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Leng h in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Addison st. from Conestoga st. to Fifty-fourth st.	2 ft. 3 in. × 1 ft. 6 in.	300.	2	1	\$80 00	3	\$50 00	h. c. 116.	\$0 60	\$69 60	\$1 65	\$802 00	\$1,603 85	\$2,405 85	.....	P. F. McGough	Jas. A. Mullen..	Oct. 24
	2 ft. 3 in. × 1 ft. 6 in. stone bl. inv.	25.	3	1	75 00	.....	.....	excavation 264.5 rubble mas'y	50	132 25	2 50							
	12 in. v. p.	50.	.....	.....	.....	.....	.....	307.	4 50	1,381 50	1 00							
Auburn st., from Gaul street to Miller street....	3 ft. × 2 ft.	146.	3	1	75 00	2	50 00	h. c. 99.	60	59 40	1 49	400 72	51 22	451 94	.....	B. H. Smithson	E. Pascuzzi.....	Dec. 22
	2 ft. cir. with 10 in. t. c. p.	303.	.....	.....	.....	4	35 00	concrete .54	5 50	2 97	3 92	747 03	614 20	1,361 23	.....	B. Z. Lippincott.	Robt. P. Ryan...	Mar. 29
Bryan st., from Mt. Pleasant ave. to Durham street	12 in. v. p.	80 5	.....	.....	.....	.....	.....	.....	.....	.....	1 00							
	3 ft. × 2 ft.	270.	3	2	75 00	3	50 00	h. c. 100.	60	60 00	1 86	735 92	126 28	862 20	.....	Robt. W. Fleming.	Wm. A. Ryan...	June 6
Belgrade st., from Lehigh ave. to Richmond Br. P. & R. Ry.	2 ft. circ. with 10 in. t. c. p.	337.	2	1	80 00	4	50 00	c. c. 40.25 st. c. 6.	2 25	90 56	2 98	724 08	1,125 94	1,850 02	.....	F. C. Spitzer...	David McMahon	J'ne 13
	Bryan st., from Allen's lane to Nippen street..		3	2	75 00	1	60 00	h. c. 427.	1 50	9 00								
									60	256 00								

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Boston st., from Coral street to Amber street....	3 ft. × 2 ft.....	375.				3	\$50 00	h. c. 360.	\$0.60	\$216 00	\$1 47	\$795 00	\$122 25	\$917 25	.....	John N. Brown	E. Pascuzzi	Jun. 27
Bristol st., from Broad street to Old York road.	2 ft 6 in. × 1 ft 8 in.	573.	2	3	\$80 00	3	50 00	c. c. 42.4	2 25	95 40	1 40	775 93	912 17	1,688 10	.....	R. C. Gamble ..	J. Jafolla & Son.	July 3
	15 in. v. p.....	6.	3	1	75 00	1	60 00	st. c. 12. h. c. 400.	1 50	18 00	1 25							
Bodine st., from Montrose st. to Christian st....	12 in. t. c pipe	199.	3	1	75 00	1	45 00	rubble mas'y. 1.18	4 50	5 31	1 80	.....	528 51	528 51	\$498 06	B. Z, Lippin- cott	E. Pascuzzi	Oct 24
			4	1	45 00													
Beck street, from Fifth street, to about 100 feet eastward	12 in. t. c pipe	183.5	4	2	45 00	1	45 00	c. c. 22.	2 25	49 50	2 21	645 04	645 04	480 57	George Webb...	Robt. P. Ryan....	Oct. 31
						1	55 00											

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Bodine st., from Willow st. to 162 feet northward.	3 ft. × 2 ft.....	170.				2	\$45 00	st. c. 6.7 reset	\$1 50	\$10 05	\$4 87	\$327 70	\$604 53	\$1,022 23	Geo. H. Schmunk.	D. S. Bader.....	Dec 4	
								60.	20	12 00								
								c. c. 6.1 rep'v'g	2 25	18 73								
								28. brick mas'y	1 50	42 00								
								1.5 rubble mas'y	9 00	13 50								
								2.9 c. c.	4 50	13 05								
Baltimore ave. (both sides) fr'm Fifty-third street to Fifty- seventh street.	3 ft. 3 in. × 2 ft. 2 in. vit. sh. br. inv.....	544.27	2	1	\$80 00	30	50 00	13.24 st. c.	2 25	29 79	2 07	4,470 66	6,046 44	10,517 10	H. J. Bader....	J. Jafolla & Son.	Nov. 4	
	3 ft. × 2 ft. vit. sh. br. inv.....	500.	8	1	75 00			6. reset	1 50	9 00	1 97							
	3 ft. × 2 ft.....	549.						32.14 exca'n	20	6 43	1 97							
	2 ft. 6 in. × 1 ft. 8 in.	1,786.64						3. 3.	50	1 50	1 90							
	2 ft. 3 in. × 1 ft. 6 in. vit. sh. br. inv.....	470.									1 85							
	2 ft. 3 in. × 1 ft. 6 in.	702.75									1 85							
•	12 in. v. p.....	58.									1 00							

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess-ment bills.	In City warrants.	Total cost.				
Courtland street, from Seventeenth street to Nineteenth st.	3 ft. 6 in. × 2 ft. 4 in.	493.5	2	2	\$80 00	8	\$35 00	c. c.	\$2 00	\$170 00	\$2 09	\$1,408 97	\$1,898 90	\$3,307 87	\$4 50	W. B. Thomas.	Patrick Durkin.	Mar. 21
	3 ft. × 2 ft.	487.	3	3	75 00			st. c.	1 10	19 89	2 00							
	2 ft 6 in. × 1 ft. 8 in.	22.						h. c.	50	301 50	1 80							
	2 ft. 3 in. × 1 ft. 6 in.	33.						603. excavation	50	10 00	1 60							
	15 in. v. p.	35.						20.			1 25							
Cora street, from Stenton ave. to Beechwood st. and in Beechwood st., from Cora street to Medary ave....	2 ft. 3 in. × 1 ft. 6 in.	220.	3	3	75 00	5	35 00	c. c.	2 00	45 34	2 80	1,153 03	1,112 41	2,265 44	B. F. Slack.....	A. D. McNeil....	Apr. 6	
	2 ft. 3 in. × 1 ft. 6 in vit. sh br inv	320.						st. c.	1 10	6 60	2 80							
	15 in. t. c. pipe.....	14.						h. c.	50	282 00	1 25							
	12 in. v. p.	2.						564.			1 00							
Camac st., from Tasker st. to Morris street..	2 ft. 6 in. × 1 ft. 8 in.	444.	4	1 re built	45 00	3	35 00	c. c.	2 00	63 0	1 54	1,096 36		1,096 36	D. S. Rorer.....	J. L. Cunnig-ham..	May 2	
	12 in. v. p.	6.		2	35 00			31.5 reset	20	3 60	1 00							
								h. c.	50	120 60								

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Cheltenham avenue, from Anderson st. to N. E. of Boyer street...	3 ft. 6 in. circ. vit. sh. b. b.	670.	2	1	\$80 00	12	\$35 00	c. c. 110.	\$2 00	\$220 00	\$8 23	\$1,676 39	\$0,896 29	\$11,072 68	T. R. Wiggins..	M. J. Hogan & Co.	May 17	
	3 ft. 3 in. circ. vit. sh. b. b.	516.	3	6	75 00			47. rubble	1 10	51 70	5 67				J. P. Flood.			
	2 ft. 3 in. × 1 ft. 6 in.	558.5						mas'y. 6.	4 50	27 00	2 43				W. S. Manser.			
	12 in. v. p.	27.									1 00							
Chatham street, from Ann st., to William street.	3 ft. × 2 ft.	676.				5	50 00				1 68	1,402 68	1,402 68	\$50 13	R. W. Fleming.	David Peoples...	July 3	
	12 in. v. p.	17.									1 00			267 03				
Cornwall street, from "F" st. to "G" street.....	2 ft. 3 in. × 1 ft. 6 in.	496.	3	2	75 00	4	50 00	c. c. 15.8	2 25	35 55	1 47	1,132 67	1,132 67	52 33	T. R. Wiggins..	J. Jafolla & Son..	July 17	
								st c. 12.	1 50	18 00								
Cedar st. (from Ann street to Cambria street.)	3 ft. × 2 ft.	550.				4	50 00				4 25	1,395 77	1,141 73	2,537 50	T. R. Wiggins..	J. Jafolla & Son..	Sep. 29	
Chestnut st. (from Fifty-fourth st. to Fifty-fifth st.)	2 ft. 3 in. × 1 ft. 6 in.	550.				4	50 00				1 52	1,076 00	1,076 00	81	George Moore.	Donato Dellse ...	Sep. 29	
	12 in. v. p.	40.									1 00			423 19				

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.		
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.						
Coral street, from Somerset street to the P. & R. Ry.	3 ft. x 2 ft.	680.5	2	2	\$80 00	4	\$50 00	c. c.	12.67	22	25	\$28 51	\$1 50	\$1,569 70	\$578 16	\$2,147 86		W. B. Thomas..	Robt. Lombardi.	Oct. 3
			3	3	75 00			st. c.	20.	1	50	30 00								
								h. c.	806.	60	483 60									
Chancellor st., from Fifty-second street to Fifty-third st.	2 ft. 3 in. x 1 ft. 6 in. 12 in. v. p.	402.5 20.	2	1	80 00	4	50 00	c. c.	27.75	2	25	62 44	1 27	1,356 32		1,356 32	\$4 18	J. N. Brown....	Robt. P. Ryan ...	Oct. 17
			3	1	75 00			st. c.	6.	1	50	9 00	1 00			60 00				
								h. c.	474.	60	284 40									
Chancellor st., from Fifty-first st. to Fifty-second st.	2 ft. 3 in. x 1 ft. 6 in. 12 in. v. p.	500. 37.				4	50 00	h. c.	260.		60	156 00	1 40	1,105 60		1,105 60	1 99	J. N. Brown....	J. McGlathery ...	Oct. 24
													1 00			353 25				

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final Estimate.		
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.						
Cresson street, from Midvale ave. to Mill st.	3 ft. circ. vit. sh. b. inv. with 10 in. t. c. p.	639.03	1	4	\$90 00	13	\$50 00	well- hole 104.56	\$7 00	\$731 92	\$6 40		\$8,905 53	\$8,905 53	\$2,383 96	J. M. Hipple...	David McMahon	Nov. 1		
	2 ft. 6 in. circ. v. s. b. inv. with 10 in. t. c. p.	407.19				1	60 00	st. c. 29.	1 50	48 50	3 98									
	2 ft. 6 in. circ. vit. sh. br. inv.	33.78						27.29	2 25	61 40	3 98									
	2 ft. circ. vit. sh. br. inv.	24.80						h. c. 168.	60	100 80	3 98									
	10 in. t. c. pipe	24 36						rubble mas'y 69.76	4 50	313 92	3 98									
	15 in. v. p.	10.						co- crete 53.51	5 50	204 31	1 25									
Cabot st., from Montgomery st., to Palmer street	2 ft. 6 in. x 1 ft. 8 in.	381.5				3	50 00	mas'y 10.52 exca- vation 244. h. c. 240.	9 00	94 68			\$923 48	\$923 48	\$8 52	W. B. Thomas	Robt. Lombardi	Nov. 14		
														30 00						

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Craig st., from Rhawnstreet to Hartel st.....	3 ft. × 2 ft. vit. sh. br. inv ...	484.	3	4	\$75 00	4	\$45 00	c. c. 36.8	\$2 25	\$82 80	\$2 59	\$2,718 88	\$2,718 88	\$2,357 02	R. W. Fleming.	Joseph Moss.....	Nov. 14
	2 ft. 3 in. × 1 ft. 6 in.	403.						st. c. 24.	1 50	36 00	2 14							
Clarissa st., from Wayne ave. to Blavis street...	3 ft. × 2 ft.....	471.08	2	3	80 00	4	50 00	reset 18.		20	3 60					John Hare.....	A. D. McNeil.....	Nov. 18
	12 in. v. p	6.	3	1	75 00			st. c. 36.	1 50	64 00	2 49	\$1,116 72	768 17	1,884 89				
	15 in. t. c. p.	98.						h. c. 24.	60	14 40	1 00							
Call whill street, from Felton st. to Sixty-third st	2 ft. 6 in. × 1 ft. 8 in. vit. sh. br. inv.....	225.				1	50 00	h. c. 256.	60	153 60	2 10	300 00	386 10	686 10		F. D. W. Morris.	Joseph Perna....	Nov. 27
	12 in. v. p	10.									1 00							
Craig st., from Welsh road to Rhawn st., and on Rhawn st., from Craig st., to Crispin st....	3 ft 3 in. × 2 ft. 2 in.	1,883.1	2	6	80 00	5	30 00	c. c. 163.93	2 00	327 86	2 05	7,349 14	7,349 14	4,407 68	R. W. Fleming.	Patrick Durkin..	Nov. 20
	2 ft. 6 in. × 1 ft. 8 in.	55.	3	2	75 00	4	40 00	st. c. 43.5	1 10	47 85	2 80							
	2 ft. 3 in. × 1 ft. 6 in.	92.	4	3	45 00			reset 23.9		20	4 78	2 00						
	12 in. v. p.	116.						h. c. 64.	60	32 00	1 00							

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
City ave. (south side), from Fifty-sixth st. to Fifty-ninth street	4 ft. × 2 ft. 8 in. stone bl. bot.....	745.	3	9	\$75 00	11	\$30 00				\$9 44		\$165,782	\$16,527 82	\$3,003 32	W. W. Brinkworth.	M. J. Hogan & Co.	Dec 30
	3 ft. 6 in. × 2 ft. 4 in.	604.				11	6 00				6 58							
	3 ft. 3 in. × 2 ft. 2 in.	435.									5 50							
	3 ft. × 2 ft.....	435.									4 72							
	12 in. v. p.....	4.									1 00							
Darlen st., from Snyder avenue to McKean st..	2 ft. 3 in. × 1 ft. 6 in.	385.	4	1	45 00	3	50 00	c. c. 10.5	\$2 25	\$23 63	1 85	\$914 88		914 88	83	George Webb..	Robt. P. Ryan...	Oct. 16
	12 in. v. p.....	12.						5. h. c. 250.	20	1 00	1 00			150 00				
Emery st., from Lehigh avenue to Cumberland street	3 ft. × 2 ft.....	920.				10	35 00				1 78	2,738 98		2,738 98	87	W. W. Brinkworth.	Patrick Burns...	Apl. 11
	2 ft. 6 in. × 1 ft. 8 in.	421.									1 78			999 29				
Eyre street, from Girard ave. to Wildey street..	3 ft. × 2 ft.....	353.	3	1	75 00	3	35 00	h. c. 224.	50	112 00	1 80	857 46	69 94	927 40		J. D. Henderson.	Andrew Kelly...	Apl. 24

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Eighth st. from Porter street to Ritner street...	2 ft. 6 in. × 1 ft. 8 in.	400.	.....	.....	.....	3	\$50 00	h. c. 528.	\$0 60	\$316 80	\$3 27	\$990 00	\$784 80	\$1,774 80	.....	P. D. Brown....	J. F. McNichol...	May 23
Eleventh street, from Allegheny ave. to Roy st..	2 ft. 6 in. × 1 ft. 8 in. vit. sh. br. inv.....	500.	3	1	\$75 00	4	50 00	st. c. 12.	1 50	18 00	2 80	1,144 84	980 16	2,125 00	.....	B. Z. Lippincott	Petriello & Bro...	Sep. 11
								h. c. 720.	60	482 00								
Edmund street, from Princeton st. to Tyson st..	2 ft. 6 in. × 1 ft. 8 in.	682.2	3	2	75 00	5	45 00	c. c. 15.75	2 25	35 44	1 85	.....	1,699 36	1,699 36	\$1,960 00	John Bishop...	Robt. Lombardi.	Oct. 17
	12 in. v. p.....	18.	.....	.....	.....	.....	.....	st. c. 5.9	1 50	8 85	1 00							
Eyre street, from Wildey st. to Salmon st.....	3 ft. × 2 ft.....	180.	.....	.....	.....	2	50 00	h. c. 108.	60	64 80	1 79	361 68	125 32	487 00	.....	B. Z. Lippincott	W. A. Ryan.....	Nov. 8
Fourth st. from Dickinson st. to Tasker st....	3 ft. × 2 ft. stone bl. bot.....	31.	4	4	45 00	3	35 00	c. c. 51.25	2 00	102 50	2 09	979 20	431 16	1,410 36	.....	F. C. Spitzer...	R. P. Ryan.....	Apr. 25
	3 ft. × 2 ft.....	412.	reset 26.	20	5 20	2 09							
	2 ft. 6 in. × 1 ft. 8 in. stone bl. bot.....	31.	2 09							
12 in. v. p.....	27	1 00							

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Fiftieth st., from Chestnut st. to Sansom st....	2 ft. 6 in. × 1 ft. 8 in.	227.17				2	\$50 00	h. c. 251.	\$.60	\$150.60	\$1 46	\$537 92	\$44 35	\$582 27	Eugene Emery	Jos. McGlathery	May 29	
Fifty-sixth street, from Woodland ave. to Paschall avenue	2 ft. 3 in. × 1 ft. 6 in.	312.5	2	1	\$80 00	3	85 00	c. c. 15.19	2 00	80 38	1 64	1,085 50	484 31	1,519 81	P. F. McGough	Jos. McGlathery	June 5	
	2 ft. 3 in. × 1 ft. 6 in. vit. sh. br. bot....	144.5						h. c. 974.	50	487 00	1 74							
	15 in. t. c. pipe.....	22.									1 25							
	12 in. v. p.....	26.									1 00							
"F" street, from Westmoreland st. to Ontario st.	4 ft. × 2 ft. 8 in. vit. sh. br. Inv.....	502.	2	3	80 00	3	50 00	c. c. 49.	2 25	110 25	3 70	1,018 00	1,811 09	2,829 09	T. R. Wiggins.	J. H. Louchheim	June 13	
	2 ft. 3 in. × 1 ft. 6 in.	126.	3	1	75 00			h. c. 215.	60	129 00	2 10							
Fifty-fourth st., from Arch st. to Race street..	2 ft. 3 in. × 1 ft. 6 in.	500.	3	1	75 00	3	50 00	rubble	4 50	2 84	1 39	1,275 00	334 25	1,609 25	H. W. Newton	McGehean & Conan.	June 19	
								mas'y 63										13.	60	660 00
Firth street, from Collins street to Trenton ave....	3 ft. × 2 ft.....	244.				2	50 00	h. c. 302.	60	181 20	1 61	642 08	31 06	674 04	J. N. Brown....	E. Pascuzzi.....	June 27	

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.		
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.						
Firth street, from Coral street to Amber street..	3 ft. x 2 ft.....	405.	3	1	\$75 00	3	\$50 00	c. c.	\$2 25	\$92 06	\$1 71	\$861 09	\$238 91	\$1,100 00	J. N. Brown...	E. Pascuzzi	Jun. 27			
								14.25 h. c. 300.										180 00		
Fairhill st., from Carpenter st. to League st., and on League st. from Fairhill st to Sixth st..	2 ft. 3 in. x 1 ft. 6 in.	434.	4	2	45 00	2	30 00	c. c.	2 00	72 34	1 70	1,071 41	6 07	1,077 48	George Moore	Andrew Kelly ...	July 24			
								36.17										72 34		
								rebuilt. rubble mass'y.										4 50	7 34	
Fifty-eighth st., from Thompson st. to Master st.	2 ft. 3 in. x 1 ft. 6 in.	451.				3	50 00	h. c.												
	12 in. v. p.....	33.						661.	60	396 60	1 40	983 75	227 25	1,211 00	John Bishop...	D. A. Perna	Aug. 14			
Forty-sixth st., from Market st. to Sanson st...	2 ft. 6 in. x 1 ft. 8 in.	244.5	2	1	80 00	6	35 00	c. c.	2 00	86 92	3 88	1,711 92	2,132 60	3,844 52	D. J. Davis	M. J. Hogan & Co.	Aug. 15			
	2 ft. 3 in. x 1 ft. 8 in.	485.17	3	2	75 00			43.46 h. c.										50	485 00	3 78
	12 in. v. p.....	50.																		1 00

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Franklin street, from Porter st. to Ritner st....	2 ft. 3 in. × 1 ft. 6 in.	406.	4	1	\$45 00	3	\$50 00	h. c. 204. excavation.	80 60	\$122 40	\$1 96	\$1,026 00	\$309 16	\$1,335 16	J. McParland...	E. Tesone	Oct. 16
									50	12 30								
									4 50	110 70								
									9 00	99 00								
Fifty-second st., from Chester ave. to Spring- field avenue....	3 ft. × 2 in.....	530.	3	1	75 00	3	50 00	st. c. 12. repav- ing. 15.	1 50	18 00	1 69	522 50	638 70	1 161 20	George Moore..	E. Tesone	Oct. 23
									1 50	22 50								
Forty-sixth st., from Osage ave. to Cedar ave....	2 ft. 3 in. × 1 ft. 6 in. vit. sh. br. inv....	233.	2	1	80 00	6	50 00	st. c. 12.	1 50	18 00	1 92	1,952 50	392 42	2,344 92	C. A. Crossin ...	J. McGlathery ...	Oct. 31
									60	502 20	1 72							
									1 00							
	12 in. v. p.	40.	

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Fifty-fifth street, from Pine st. to Cedar ave.....	3 ft. 6 in. × 2 ft. 4 in. vit. sh. br. inv.....	557.5	2	5	\$80 00	8	\$50 00	c. c. 73.88	\$2 25	\$166 23	\$4 87	\$2,317 97	\$4,046 53	\$6,364 50	T. J. Morrow..	McCormick & Co	Dec. 29	
	2 ft. 8 in. × 1 ft. 6 in.	541.	3	1	75 00			st. c. 12.	1 50	18 00	3 20							
	15 in. t. c. p.....	7.						h. c. 1,151.	60	600 60	1 25							
	12 in. v. p.....	75.						rubble mas'y 8.	4 50	36 00	1 00							
Greenwich st., from Front st. to Second st....	rebuilt																	
	2 ft. 6 in. × 1 ft. 8 in. 2 ft. 6 in. × 1 ft. 8 in. stone bl. inv.....	475.		2	35 00	8	50 00	c. c. 31.5	2 25	70 88	1 49	1,048 43	3 9 13	1,417 56	John Doyle....	Robt P. Ryan...	June 13	
	12 in. v. p.....	22.						10. h. c. 634.	20	2 00	1 49							
Gordon st., from Almond street to Belgrade st..	2 ft. 6 in. × 1 ft. 8 in.	315.	3	1	75 00	3	35 00	exca- vation 8.5	50	1 75								
	15 in. t. c.....	16.						c. c. 10.17	2 00	20 34	2 10	756 16	125 68	881 84	B. Z. Lippin- cott.	Andrew Kelly...	July 25	
Gaul street, from Ann street to William st.....	3 ft. 6 in. × 2 ft. 4 in.	395.				6	50 00				2 00	1,589 01	257 50	1,846 60	T. R. Wiggins.	J. Jafolla & Son.	Aug. 8	
	3 ft. × 2 ft.....	345.									2 00							

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Gratz st., from Dauphin st. to York st., and on York st., from Cleveland ave. to Nineteenth street.....	3 ft. cir. vit. sh. br. bot.....	716.	2	2	\$ 0 00	7	\$35 00	well- hole. 64.33	\$7 00	\$450 81	\$7 24	\$1,054 81	\$4,710 06	\$6,665 77	T. J. Morrow....	R. P. Ryan.....	Aug. 29	
	3 ft. x 2 ft. stone bl. bot.....	176.						c. c. 13.9 rubble mas'y. 4.	2 00	27 80	3 30							
Gordon st., from Twenty-ninth street to 70 feet eastward.....	2 ft. 3 in. x 1 ft. 6 in.	120.98				1	50 00				8 19	153 50	282 48	435 98	John Hare.....	D. S. Bader.....	Nov. 27	
Harlan st., from Fifty-fourth st. to Conestoga st.	2 ft. 3 in. x 1 ft. 6 in.	294.	3	1	75 00	3	30 00	c. c. 13.	2 00	26 00	1 98	763 88	21 24	785 12	D. S. Rorer.....	Patrick Burns...	Jan. 25	
	12 in. v. p.....	12.									1 00							
Heston st., from Fifty-second st. to 200 feet west- ward.....	2 ft. 3 in. x 1 ft. 6 in.	302.				2	35 00	h. c. 90.	50	45 00	1 73	600 00	37 46	6 7 46	P. F. McGough.	J. L. Cunningham	Apr. 11	

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Harold st. from Memphis st. to Martha street.	3 ft. × 2 ft.	491.				12	\$50 00	h. c. 446.	\$0 50	\$223 00	\$1 68	\$2,230 03	\$856 81	\$2,586 84		R. W. Fleming	Patrick Durkin.	May 23
	2 ft. 6 in. × 1 ft. 8 in.	527.									1 68							
	12 in. v. p.	9.									1 00							
Haines st. from Crittenden st. to Steaton ave.	2 ft. 3 in. × 1 ft. 6 in. vit. sh. br. bot.	453.	2	1	\$80 00	6	35 00	c. c. 37.5	2 00	75 00	5 84	1,897 99	3,024 22	4,922 21		W. J. Kiley	J. H. Deehan & Co.	May 31
	2 ft. 3 in. × 1 ft. 6 in.	202.25	3	1	75 00			st. c. 13.5	1 10	14 85	5 84							
	12 in. v. p.	10.						h. c. 1,203.	50	601 50	1 00							
Hall street, from Ninth street to Tenth street.	2 ft. 3 in. × 1 ft. 6 in.	396.	4	2	45 00	3	30 00	c. c. 12.25	2 00	24 50	1 89	860 25	122 69	982 94		C. A. Crossin	Robt. Lombardi.	June 13
	12 in. v. p.	30.									1 00							
Hurley st. from Allegheny ave. to Clearfield st.	3 ft. × 2 ft.	560.	2	1	80 00	4	50 00	c. c. 42.	2 25	94 50	1 72	1,275 00	390 90	1,665 90		R. C. Gamble	J. Jafolla & Son.	July 17
			3	2	75 00			h. c. 297.	60	178 20								
Hewson st. from Cedar street to Thompson st.	3 ft. × 2 ft.	1,176.				9	50 00	h. c. 691.	60	414 60	1 67	2,882 52		2,882 52	\$0 63	John Doyle	R. P. Ryan	July 18
	12 in. v. p.	54.									1 00			138 70				

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Jessup st., from Catharine st. to Fitzwater st....	2 ft. 3 in. × 1 ft. 6 in.	342.	4	1	\$45 00	2	\$30 00	c. c. 13.5	\$2 00	\$27 00	\$1 90	\$353 80		\$853 80	\$8.70	R. C. Gamble...	Robt. Lombardi	May 16
	12 in. v. p.	32.				1	40 00				1 00							
Jessup st., from Locust street to 75 feet south of Irving street....	2 ft. 3 in. × 1 ft. 6 in.	207.	4	2	45 00	3	50 00	c. c. 24.	2 25	54 00	1 97	765 19	\$118 90	884 09		C. A. Crossin...	Robt Lombardi	Jun. 13
	12 in. v. p.	5.									1 00							
	3 ft. × 2 ft. vit. sh. br. inv.....	521.	2	1	80 00	4	50 00	c. c. 21.42 h. c. 20.5 378. repav- ing. 5. exca- vation 20.5 c. c. 83.25 st. c. 6. h. c. 896. rubble mas y. 86.	2 25 60 1 50 50	48 20 226 80 7 50 10 23	2 39	1,356 87	461 07	1,817 94		Eugene Emery	Walter D. Stone.	Oct. 17
Kip street, from Indiana street to Cambria st..																		
	3 ft. 3 in. × 2 ft. 2 in.	347.	2	3	80 00	6	35 00	c. c. 83.25 st. c. 6.	2 00	166 50	1 65	2,067 42	1,031 23	3,098 65		C. E. Preston...	Joseph Perna	Jun. 5
Larchwood ave., from Conestoga street to Fifty- third st.	3 ft. × 2 ft.	23.	3	2	75 00			h. c. 6.	1 10	6 60	1 60							
	2 ft. 6 in. × 1 ft. 8 in.	512.						h. c. 896. rubble mas y. 86.	50	448 00	1 60							
	12 in. v. p.	62.							4 60	387 00	1 00							

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.		MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.	
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.		Total cost.	In assess- ment bills.	In City warrants.					Total cost.
Ludlow st. from Markoe st. to Forty-eighth st.	3 ft. x 2 ft.	283.				6	\$85 00	h. c. 8.	\$0 50	\$4 00	\$5 75		\$5,577 57	\$5,577 57	\$1,005 00	Eugene Emery	Joseph Perna ...	Aug. 24
	2 ft. 6 in. x 1 ft. 8 in.	575.						rubble mas'y	4 50	1,154 07	4 25							
	2 ft. 3 in. x 1 ft. 6 in.	30.						256.46										
	12 in. v. p.	8.																
Locust st. from Forty-sixth st. to Forty- seventh st. and on Forty- seventh street, from Locust st. to Osage ave....	3 ft. 3 in. x 2 ft. 2 in. vit. sh. br. bot...	572.	2	2	\$80 00	11	95 00	c. c. 85.25	2 00	170 50	3 50	\$3,810 00	2,887 11	6,697 11		D. J. Davis.....	D. S. Bader.....	Sep. 26
	2 ft. 3 in. x 1 ft. 6 in.	989.	3	6	75 00			h. c. 9.0.	50	470 00	3 00							
	12 in. v. p.	47.						exca- vation	50	8 00	1 00							
Larchwood ave., from Forty- sixth street to Forty-seventh street.....	2 ft. 3 in. x 1 ft. 6 in.	500.	3	1	75 00	4	50 00	16. rubble mas'y	4 50	31 50						George Moore.	Emilio Tesone..	Nov. 21
	12 in. v. p.	29.						7. con- crete	5 50	6 11	1 48	1 275 00	323 35	1,598 35				
								1.11 c. c. 15.71	2 25	35 35								
							st. c. 6.	1 50	9 00									
							h. c. 850.	60	510 00									

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.	
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.					
Locust st., from Fifty-first st. to Fifty-third street.....	3 ft. 6 in. × 2 ft. 4 in.	558.	3	2	\$75 00	6	\$50 00	c. c.	28.75	\$2 25	\$64 69	\$1 69	\$2,854 66	\$267 02	\$3,121 68	.....	J. N. Brown....	R. P. Ryan.....	Oct. 13
	2 ft. 6 in. × 1 ft. 8 in. vit. sh. br. inv....	7.	.....	.....	.....	.....	.....	st. c.	6.	1 50	9 00	1 40	.....	.....	.....	.....	.....	.....	.....
	2 ft. 3 in. × 1 ft. 6 in.	513.	.....	.....	.....	.....	.....	h. c.	1401.	60	840 60	1 39	.....	.....	.....	.....	.....	.....	.....
	12 in. v. p.....	12.	excava- tion.	150	50	75 00	1 00
Mt. Airy avenue, from Chew st. to Boyer street.)	2 ft. 6 in. × 1 ft. 8 in.	604.	.....	.....	.....	5	35 00	.....	.....	.....	.....	2 85	1,796 03	100 37	1,896 40	.....	T. D. Hooper...	David McMahon.	Mar. 28
	3 't. × 2 ft.	285.	.....	.....	.....	3	50 00	h. c.	210.	60	126 00	1 97	622 88	214 57	837 45	.....	B. H. Smithson	R. Lombardi....	May 22
Memphis street, from Allegh- eny avenue to Ann street.....	3 ft. × 2 ft.	1,681.	12	35 00	excava- tion.	260.	50	130 00	2 94	4,249 10	2,696 50	6,945 60	John Doyle....	E. H. Vare.....	June 1
	12 in. v. p.....	18.	concre- te.	239.	5.50	1,314 50	1 00
								y. p. platf'm	302 4.	40 00	120 96

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.		
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.						
Mansion st., from Gay street to Levering st.	12 in. t. c. pipe.....	167.	4	4	\$45 00	1	\$45 00	h. c. 24.	80 60	\$14 40	\$2 79	.....	\$762 58	\$762 58	.....	J. M. Hipple...	David McMahon	June 5
						1	55 00	rubble mas' y. 0.5	4 50	2 25										
Martha st., from Somerset st. to Silver street....	3 ft. x 2 ft.....	414.	2	2	80 00	2	35 00	c. c. 102.25	2 00	204 50	1 65	\$764 47	885 58	1650 00	.....	B. H. Smithson	John Devlin, Jr.	June 13	
						1	45 00	h. c. 120.	0 50	60 00	1 25									
Mansion st., from Ripka street to Levering ton avenue	15 in. t. c. with 8 in. t. c.....	258.25	3	1	75 00	3	30 00	rubble mas' y. 3.5 concrete 1.	4 50	15 75	6 00	408 07	1658 68	2126 75	.....	John Hare	Richard Bennis..	July 18	
	15 in. t. c.....	41.				1	40 00		5 50	5 50	6 00									
	8 in. t. c.....	43.5									2 00									
	6 in. t. c.....	39.									0 50									
Media st., from Robinson st. to Sixty-first st., and on Sixty-first street from Media street to Lansdowne av.	2 ft. 3 in. x 1 ft. 6 in.	746.	3	2	75 00	3	50 00	c. c. 26.	2 25	58 50	1 57	1900 13	395 40	2304 62	.....	H. W. Newton	McGehean & Conan	Aug. 14	
	12 in. v. p.....	67.5						h. c. 1179.	0 60	707 40	1 00									

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.	
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.					
Monmouth st., from Gaul st. to Belgrade st.	3 ft. × 2 ft	300.	.....	.....	.....	3	\$50 00	.....	.....	.....	\$1 44	\$582 00	.....	\$582 00	\$1 06	T. R. Wiggins.	J. Jafolla & Son.	Aug. 15
														171 47					
Mole street, from Mifflin street to Moore street....	2 ft. 3 in. × 1 ft. 6 in. 12 in. v. p.	400. 30.	.....	.....	.....	3	50 00	h. c. 230.	\$0 60	\$138 00	1 34	854 00	.....	854 00	8 00	Thos. Levens..	B Monaghan....	Oct. 2
														192 50					
Montgomery st., from Sedgley avenue to Thir- tieth street....	4 ft. circ. vit. sh. br. bot.	359.6	.....	.....	.....	3	35 00	well 41.75	hole 7 00	292 25	16 15	459 45	\$6,539 94	6,999 39	.....	G. M. Raphael.	Henderson & Co., Ltd.	Oct. 4
	15 in. t. c.	215.	repav- ing 14.5	3 00	43 50	2 10
	12 in. v. p.	6.	excav- ation 40.	50	20 00	1 00
									rubble 60.8	mas- onry 4 50	273 60
Moyamensing avenue from Eleventh street to Twelfth st..	2 ft. 6 in. × 1 ft. 8 in. 12 in. v. p.	471. 48.	.....	.....	.....	4	50 00	.....	.....	.....	2 21	1,007 73	281 18	1,288 91	.....	W. B. Thomas.	Emilio Tesone..	Oct. 21
Memphis street, from Ann st. to Auburn street .	3 ft. × 2 ft. 12 in. v. p.	934. 7.	7	50 00	excav- ation 27.33	50	13 67	4 63	2,462 66	2,382 75	4,845 41	T. R. Wiggins.	H. E. Ruch.....	Nov. 20	
								concr- ete 27.33	50	150 82	1 00		

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.			
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.							
Ninth st., from Porter st. to Ritner street...	2 ft. 6 in. × 1 ft. 8 in.	402.	.....	.....	.....	3	\$50 00	h. c. 496.	80 60	\$297 60	\$8 27	\$1,167 59	\$938 65	\$2,106 24	.....	J. McParland.	J. F. McNichol...	Sept. 7			
			.....	.....	.....	.....	.....	excavation 68.82	50	34 41	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osage ave., from Fifty-fourth st. to Fifty-fifth st.	2 ft. 3 in. × 1 ft. 6 in.	500.	.....	.....	.....	2	1	\$80 00	5	50 00	h. c. 350.	60	210 00	1 85	1,803 00	1,764 07	3,067 07	.....	P. F. McGough.	Jas A. Mullen ...	Oct. '28
			.....	.....	.....	.....	.....	.....	excavation 252.	50	126 00	2 35	.....	.....	.....	.....	.....	.....	.....	.....
			.....	.....	.....	.....	.....	.....	.....	stone bl. inv..... rubble masonry. 2 3.27	4 50	1,274 72	1 00	.....	.....	.....	.....	.....	.....	.....	.....
Osage ave., from Forty-sixth st. to Forty- seventh st.....	2 ft. 3 in. × 1 ft. 6 in.	500.	.....	.....	.....	3	1	75 00	4	50 00	st. c. 6.	1 50	9 00	1 49	1,200 00	375 00	1,575 00	.....	P. F. McGough.	Emilio Tesone...	Nov. 28
			.....	.....	.....	.....	.....	.....	h. c. 850.	60	510 00	1 00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Paxon st., from Greenway ave. to Kingsessing avenue.....	2 ft. 6 in. × 1 ft. 8 in.	518.	.....	.....	.....	2	2	80 00	4	35 00	c. c. 28.66	2 00	57 32	1 96	1,200 00	522 60	1,722 60	.....	W. L. Holbrook	J. McGlathery ...	Jan. 24
			.....	.....	.....	.....	.....	.....	h. c. 700.	50	350 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Poplar st., from Fifty-fifth st. to about 125 feet eastward.....	2 ft. 3 in. × 1 ft. 6 in.	122.	2	35 00	h. c. 88.	50	44 00	2 59	316 02	117 06	433 98	Eugene Emery.	J. Jafolla & Son..	Apr. 11
		
	12 in. v. p.....	4

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Price st., from Crittenden st. to Stenton ave.	4 ft. 6 in. c. p.	480.5	2	3	\$80 00	4	\$35 00	c. c. 3 .33	\$2 00	\$68 66	\$9 64	\$1 188 86	\$4,249 80	\$5,438 66	W. J. Killey...	M. J. Hogan & Co	May 19	
	3 ft. 3 in. x 2 ft. 2 in.	7.						h. c. 581.	50	290 50	9 64							
Across private Property, between depression in Smick street (n. w. of Hermitage st.) and Umbria st.	8 in. t. c. p.	186.75				1	50 00	wellhole excavation	19.33	7 00	135 31	3 33	879 09	879 09	John Hare....	J. F. McNichol..	Jun. 27	
						1	55 00	rubbl- mas onry	6.5	50	3 25							
								concrete	1.2	4 50	5 40							
								st. c.	1.5	5 50	8 25							
Pine street, from Forty-sixth st. to Forty-seventh street.	2 ft. 3 in. x 1 ft. 6 in.	500.	3	1	75 00	4	50 00	6.	1 50	9 00	1 88	1,200 00	507 00	1,707 00	Geo. Webb...	M. J. Hogan & Co	Oct. 31	
	12 in. v. p.	3.						h. c. 800.	60.	480 00	1 00							
Rockland street, from York road to Broad street.	2 ft. 6 in. x 1 ft. 8 in.	126.	3	2	75 00	2	35 00	s. c. 12.	1 10	13 20	2 98	312 08	316 20	629 18	Frank Sp tzer.	David McMahon	Mar. 7	
Kising Sun ave. (n. w. s.), from Fifth street to Sixth st., and (s. e. s.) from Fifth street to Butler street...	2 ft. 3 in. x 1 ft. 6 in.	1,094.	3	3	75 00	8	50 00	h. c. 41.	50	20 50								
	12 in. v. p.	67.						s. c. 24.	1 50	36 00	1 63	1,218 98	1,346 94	2,565 92	W. S. Mauser..	David Peoples...	July 5	

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Robinson street, from Haverford street to Media street ...	2 ft. 3 in. × 1 ft. 6 in. vit. sh. br. inv.	302.	3	1	\$75 00	6	\$50 00	c. c. 27.06	\$2 25	\$60 89	\$1 66	\$2,248 85	\$268 17	\$2,517 02	.....	R. C. Gamble...	J. Jafolla & Son..	June 13
	2 ft. 3 in. × 1 ft. 6 in.	526.	....	1	35 00	.....	.....	h. c. 1104.	60	662 40	1 66							
	12 in. v. p.	8.	.....	.....	.....	.....	.....	.....	.....	.....	1 00							
	15 in. t. c. p.	1.	.....	.....	.....	.....	.....	.....	.....	.....	1 25							
Richmond street, from Junlata st. to Orthodox street	4 ft. × 2 ft. 8 in.	805.	3	8	75 00	9	45 00	c. c. 88.65	2 25	199 46	3 95	3,750 12	2,571 57	6,321 69	.....	J. N. Brown....	E. Pascuzzi	Aug. 15
	3 ft. × 2 ft.	744.	.....	.....	.....	.....	.....	st. c. 24.	1 50	36 00	2 31							
	2 ft. 6 in. × 1 ft. 8 in.	81.	.....	.....	.....	.....	.....	reset 21.5 excavation 1.4 brick mas'y 0.5	20	4 30	2 14							
Rhawn st., from Cottage st. to Ditman st.	2 ft. 6 in. × 1 ft. 8 in.	591.2	3	3	75 00	4	45 00	c. c. 49.4	2 25	111 15	1 85	.....	1,627.87	1,627 87	\$1,142 73	D. S. Rorer	R. P. Bennis.....	Oct. 17
								st. c. 12.	1 50	18 00								

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Ruffner st., from Fifteenth st to Sixteenth st....	2 ft. 3 in. × 1 ft. 6 in.	194.	3	1	\$75 00	1	\$50 00	st. c. 6.	\$1 50	\$9 00	\$2 20	\$107 38	\$205 42	\$612 80	.....	H. W. Newton.	Chas. D. Land....	Oct. 23.
	12 in. v. p.....	12.	.....	.....	.....	.....	.....	reset 5. h. c. 65.	20	1 00	1 00	.....	.....	.....	.....	.....	.....	.....
Reach st., from Ontario st. to Tioga street....	2 ft. 3 in. × 1 ft. 6 in. vit. sh. br. inv....	500.	3	1	75 00	3	45 00	h. c. 593.	60	355 80	1 42	1,270 50	5 30	1,275 80	.....	George Webb.	R. P. Ryan	Nov. 27
	4 ft. circ	998.	3	2	75 00	9	85 00	wellh ole 38.5	7 00	269 50	12 00	.....	20,441 75	20,441 75	.....	W. E. Haley....	J. H. Louchhelm.	Apr. 11
Seventh st., from Thompson st. to Columbia avenue	4 ft. × 2 ft. 8 in.....	526.	.....	.....	.....	.....	c. c. 36.2	2 00	72 40	10 00	.....	.....	.....	.....	.....	.....	.....	.....
	3 ft. × 2 ft.....	478.	.....	.....	.....	.....	repav log 15.	3 00	45 00	4 00	.....	.....	.....	.....	.....	.....	.....	.....
	2 ft. 3 in. × 1 ft. 6 in	20.	.....	.....	.....	.....	short ing 780.	40 00	81 20	4 00	.....	.....	.....	.....	.....	.....	.....	.....
	15 in. v. p.....	4.	.....	.....	.....	.....	aspha lt base 186.	70	130 20	1 25	.....	.....	.....	.....	.....	.....	.....	.....
							exca- vation 264.9 rubble mas'y 14.	50	132 45	.....	.....	.....	.....	.....	.....	.....	.....	.....
								4 50	63 00	.....	.....	.....	.....	.....	.....	.....	.....	.....

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Locations.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON-NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess-ment bills.	In City warrants.	Total cost.				
Sixty-second st., from Market st. to Walnut street	3 ft. x 2 ft	817.87	2	3	\$80 00	8	\$35 00	c. c. 87.43	\$2 00	\$174 86	\$2 46	\$2,333.93	\$2,122.25	\$4,456 18	P. F. McGough.	Jos. McGlathery	Mar. 28	
	2 ft. 6 in. x 1 ft. 8 in.	227.17	3	4	75 00			st. c. 30.	1 10	33 00	2 00							
	2 ft. 3 in. x 1 ft. 6 in.	123.						h. c. 1,496.	50	748 00	1 74							
Salmon st., from Madison st. to Allegheny ave.	3 ft x 2 ft	347.	3	1	75 00	3	35 00	h. c. 154.	50	77 00	2 10	897 29	113 41	1,010 70	D. J. Davis....	Andrew Kelly..	Apr. 20	
	15 in. v. p.	20.									1 25							
Sixty-seventh st., from Leeds st. to Haddington street, and on Haddington st. from Sixty-seventh st. to Sixty-sixth st.	2 ft. 3 in. x 1 ft. 6 in. vlt. s. br. b.	448.	2	1	80 00	4	30 00	c. c. 38.	2 00	76 00	4 04	1,632 00	6,550 69	8,182 69	H. J. Bade	T. F. Reilly.	Apr. 18	
	2 ft. 3 in. x 1 ft. 6 in.	186.	3	2	75 00			h. c. 336.	50	168 00	4 67							
	12 in. v. p.	2.						ru ble mas'y 1090.7	4 50	4,908 15	1 00							
Sharswood street, from Conestoga street to Fifty-fourth street ...	2 ft. 3 in. x 1 ft. 6 in.	294.	3	1	75 00	3	30 00	c. c. 13.	2 00	25 00	1 98	763 88	21 24	785 12	W. B. Thomas.	Patrick Burns..	May 22	
	12 in. v. p.	12.									1 00							

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Locations	Size.	Length.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Stenton avenue, from Anderson st. to Cheltenham avenue	3 ft. x 2 ft. stone bl. bot.	49.5	2	2	\$80 00	4	\$30 00	c. e. 15.75	82 00	\$31 50	\$6 47	\$1,145 34	\$3,642 41	\$4,787 75	W. J. Kiley	M. J. Hogan & Co.	May 8	
	2 ft. 3 in. x 1 ft. 6 in. vit. sh. br. bot.	539.5	3	1	75 00	1	40 00	18. h. c. 677.	1 10	19 80	6 54							
	12 in. t. c.	31.5							50	338 50	4 90							
Sergeant st., from Richmond st. to Salmon st.	2 ft. 6 in. x 1 ft. 8 in.	175.				2	50 00	h. c. 100.	60	60 00	1 69	381 50	74 25	455 75	John Hare	W. A. Ryan	May 29	
Sullivan street, from Cheltenham ave. to Woodlawn street	2 ft. 3 in. x 1 ft. 6 in.	374.				3	35 00	h. c. 468.	50	234 00	4 40	851 97	1,170 13	2,022 10	W. S. Manser	David McMahon	May 29	
	15 in. t. c.	2.										1 25						
	12 in. v. p.	35.										1 00						
Sullivan st., from Stenton ave. to Woodlawn st.	2 ft. 3 in. x 1 ft. 6 in. vit. sh. br. bot.	457.				4	35 00	h. c. 782.	50	391 00	5 10	1,123 30	1,741 40	2,864 70	W. S. Manser	Richard Bennis	May 29	
	12 in. v. p.	3.										1 00						
Harswood street, from Twenty-first street to Twenty-second street	2 ft. 3 in. x 1 ft. 6 in.	438.5	3	1	75 00	3	35 00	c. e. 15.08	2 00	30 16	1 56	1,132 22		1,132 22	81 78	B. Z. Lippincott	Andrew Kelly	Jun. 13
	12 in. v. p.	7.	rebuilt	1	35 00			h. c. 392.	50	196 00	1 00				66 00			

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Locations.	Size.	Length.	INLETS.				MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.	Cost per foot.		In assess- ment bills.	In City warrants.	Total cost.				
Sixth st. from Rising Sun ave. to Pike street..	3 ft. x 2 ft. vit. sh. br. b. t.....	179.	3	4	\$75 00	6	\$50 00	c. c. 57.7	\$2 25	\$129 83	\$1 43	\$1 527 77	\$899 57	\$2,427 34	\$71 01	Jno. N. Brown.	E. Pascuzzi.....	May 31	
	2 ft. 6 in. x 1 ft. 8 in.	548.						st. c. 24.	1 50	36 00	1 43								
	12 in. v. p.....	30.						h. c. 979.	60	587 40	1 00								
Spruce st. from Cobb's Creek to Sixty-second st.	3 ft. 3 in. cl. c. tone b. b.....	404.42	2	2	80 00	5	35 00	excavation 9.	50	4 50									
	3 ft. 3 in. x 2 ft. 2 in. vit sh. b. b.....	625.	3	2	75 00			well hol 31.82	7 00	222 74	5 87	6,363 58	6,363 58	2,345 25	J. McParland.	Joseph Perna...	July 11		
	3 ft. x 2 ft. stone b. b.....	94.						c. c. 30.36	2 00	60 72	3 00								
	2 ft. 6 in. x 1 ft. 8 in. stone b. b.....	4.						st. c. 10.	1 10	11 00	3 00								
	2 ft. 3 in. x 1 ft. 6 in. stone b. b.....	40.						excavation 104.7	50	52 35	3 00								
	15 in. v. p.....	32.						concrete 11.11	5 50	61 11	2 00								
Smilek st. from Wright street to Fountain st.	12 in. t. c. with 8 in. t. c.....	452.5	2	2	80 00	4	45 00	rubble mas onry 62.09	4 50	279 41	1 25								
	8 in. t. c.....	12.5						well hol 15.75	7 00	110 25	3 77	1,179 44	1,024 97	2,204 41	John Ha e.....	J. F. McNichol..	July 18		
	6 in. v. p.....	11.									60								

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Locations.	Size.	Length.	INLETS.		MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.	
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.		Total cost.	In assessment bills.	In City warrants.					Total cost.
Sixty-second st., from Walnut street to Pine street	3 ft. × 2 ft.	427.25	2	2	\$80 00	9	\$35 00	c. c. 105.77	\$2 00	\$211 54	\$1 70	\$2,791 80	\$1,014 34	\$3,806 20	J. McFarland	Joseph Perna	July 25	
	2 ft. 6 in. × 1 ft. 8 in.	45.	3	4	75 00			st. c. 12.	1 10	13 20	1 60							
	2 ft. 3 in. × 1 ft. 6 in.	746.75						h. c. 1608.	50	804 00	1 50							
	12 in. v. p.	84.									1 00							
Sixty-sixth st., from J. A. Sandowne ave. to Malvern ave ..	3 ft. × 2 ft. vit sh. br. bot.	621.53	2	5	80 00	9	30 00	c. c. 61.92	2 03	123 84	4 46	4,002 12	13,868 00	18,770 12	G. W. Schmunk	David Peoples	July 31	
	2 ft. 3 in. × 1 ft. 6 in. vit. sh. br. bot.	605.47	3	1	75 00			h. c. 2046.	50	1,023 00	3 95				J. W. Harmer			
	2 ft. 3 in. × 1 ft. 6 in.	572.						rubble masonry 1740.6	4 50	7,832 70	3 95							
	12 in. v. p.	77.									1 00							
	15 in. t. c.	11.									1 25							
	6 in. c. l. pipe	1332.									1 15							
Sigel st., from Twenty-first st. to Twenty-second street	2 ft. 3 in. × 1 ft. 6 in.	410.	rebuilt	2	35 00	3	35 00	h. c. 233.	50	126 50	1 30	899 50		899 50	\$36 40	B. Z. Lippincott	Andrew Kelly	Aug. 1
	12 in. v. p.	24.									1 00			144 22				

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Locations.	Size.	Length.	INLETS.			MAN-HOLES.		WELLHOLES, CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Sixth st., from Hunting Park ave. to 50 feet south	5 ft. 6 in. circ. vit. sh. b. b.	100.	2	2	\$80 00			c. c. 30.4	\$2 25	\$68 40	\$11 00	\$75 00	\$1,693 97	\$1,773 97	D. S. Rorer....	Alfonso Zecca...	Aug. 7	
	3 ft. × 2 ft.	101.						h. c. 20.	63	12 00	2 57							
	2 ft. 3 in. × 1 ft. 6 in.	87.									2 00							
Silver st., from Martha st. to Amber street	3 ft. × 2 ft.	322.				2	\$50 00	h. c. 288.	60	172 80	2 27	843 00	160 74	1,003 74	W. B. Thomas.	J. B. McNichol..	Aug. 8	
Sixth st., from Wolf street to Moyamensing avenue	2 ft. 6 in. × 1 ft. 8 in.	308.	4 rebuilt	3 1	45 00	2	50 00	c. c. 48.83 reset	2 25	109 87	1 59	602 83	293 76	806 59	H. W. Newton.	J. P. McNichol..	Oct. 2	
	12 in. v. p.	21.		1	35 00			30.	20	6 00	1 00							
Sixty-second st., from Naudain street to Cedar avenue	2 ft. 3 in. × 1 ft. 6 in.	280.				2	50 00	h. c. 386.	60	231 60	1 32	588 75	142 45	731 20	F. D. W. Morris	Donato Delise...	Oct. 16	
	12 in. v. p.	30.									1 00							
Sixty-fifth st., from Greenway ave. to Upland street	2 ft. 3 in. × 1 ft. 6 in.	313.	3	1	75 00	2	50 00	h. c. 416.	60	249 60	1 39	753 00	110 67	863 67	G. H. Schmunk	J. McGlathery...	Oct. 23	
	12 in. v. p.	4.									1 00							

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Locations.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Sigel street, from Twentieth st. to Twenty-first st.	2 ft. 3 in. × 1 ft. 6 in.	507.	.....	.....	.....	3	\$50 00	h. c. 319.	80 60	\$191 40	\$1 37	\$1,053 09	.....	\$1,053 09	\$3 51	Thos. Levens..	Bernard Monaghan.	Oct. 27
Sixty-first street, from Master st. to Media street.)	12 in. v. p.	18.	.....	.....	.....	.....	.....	.....	.....	.....	1 00	.....	.....	303 00	.....	.....	.....	.....
St. James street, from Second st. American st.	2 ft. 3 in. × 1 ft. 6 in.	526.	.....	.....	.....	3	50 00	h. c. 694.	60	416 40	1 29	1,244 94	.....	1,244 94	1 47 125 06	F. D. W. Morris	Donato D lise...	Oct. 28
Seventh st., from Porter street to Ritner st.	12 in. t. c. p.	316.	4	1	845 00	2	45 00	c. c. 19.42 concrete	2 25	48 70	3 24	.....	.....	.....	.....	.....	.....	.....
Porter street to Ritner st.	2 ft. 6 in. × 1 ft. 8 in.	401.	.....	.....	.....	3	50 00	h. c. 543.	60	325 80	3 27	987 00	800 07	1,787 07	661 50	J. P. Flood....	Robt. P. Ryan...	Oct. 31
Sixty-first street, from Arch st. to Vine st.	2 ft. 6 in. × 1 ft. 8 in.	585.	3	3	75 00	6	50 00	h. c. 51.	2 25	114 75	1 59	2,416 83	1,085 77	3,502 60	.....	D. J. Davis....	D. S. Bader.	Nov. 21
Sixty-first street, from Market st. to Chestnut street	2 ft. 3 in. × 1 ft. 6 in.	500.	.....	.....	.....	.....	.....	h. c. 1,857.	60	1,114 20	1 59	.....	.....	.....	.....	.....	.....	.....
	12 in. v. p.	68.	.....	.....	.....	.....	.....	.....	.....	.....	1 00	.....	.....	.....	.....	.....	.....	.....
	2 ft. 6 in. × 1 ft. 8 in.	259.5	2	1	80 00	4	50 00	c. c. 27.75 st. c.	2 25	62 44	1 20	1,018 88	715 56	1,734 44	W. B. Thomas.	Robt. Lombardi.	Dec. 5
	2 ft. 3 in. × 1 ft. 6 in.	265.5	3	2	75 00	h. c. 850.	60	510 00	1 25
	15 in t. c.	12.
	12 in. v. p.	60.	1 00

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAY-HOLES.		WELLHOLES, C. CURB, H. CON- SECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.	
			Size	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.					
Thayer st., from Kensington ave. to Jasper street.....	2 ft. 3 in. × 1 ft. 6 in.	565.	3	1	\$75 00	4	\$35 00	st. c											
								6.	81 10	\$6 60	81 49	\$1,357 45			\$1,357 45	\$2 32	J. N. Brown....	J. Jafolla & Son..	Jan. 31
								h. c.	50	294 00									
								588.	50										
Tucker st., from Cedar st. to 150 feet northwest.)	2 ft. 6 in. × 1 ft. 8 in.	150.				2	35 00				2 08	382 00		382 00	11 81	R. W. Fleming.	Patrick Durkin.	Apr. 11	
															23 53				
Tasker st., from Twenty-sev- enth st. to Twenty-eighth street.....	2 ft. 6 in. × 1 ft. 8 in. 12 in. v. p.....	401. 32.	4	4	45 00	3	35 00	h. c.	50	277 00	4 63	1,008 00	\$3,064 47	4,072 47		W. L. Holbrook	R. P. Ryan.....	May 16	
								excavation	50	288 45	1 00								
								rubble masonry	4 50	1,298 03									
								coner etc	5 50	179 58									
								32.65											
Taony st., from Bridge st. to Kennedy st.....	3 ft. × 2 ft..... 2 ft. 6 in. × 1 ft. 8 in.	695.5 21.5	2	2	80 00	4	50 00	c. c.	52.65	2 25	118 46	2 30	923 92	1,468 30	2,397 22		Geo. W. Myers.	R. P. Bennis.....	Jun. 19
								st. c	26.	1 50	39 00	2 50							
								reset	6.8										
									20	1 36									

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Thayer st., from "F" st. to "G" street.....	2 ft. 3 in. × 1 ft. 6 in.	495.	3	2	\$75 00	4	\$50 00	c. c. 15.6	\$2 25	\$35 1	\$1 44	\$1,185 00	\$187 43	\$1,372 43	.....	T. R. Wiggins..	J. Jafolla & Son	July 3
	12 in. v. p.	34.	.....	.....	.....	.....	.....	st. c. 12.	1 50	18 00	1 00	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	h. c. 336.	60	201 60	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	rubble 4.65	4 50	20 98	.....	.....	.....	.....	.....	.....	.....	.....
Thompson st., from Ash st. to Bridge st....	3 ft. × 2 ft.	434.5	2	2	80 00	6	50 00	c. c. 61.78	2 25	138 80	1 62	1,518 62	813 08	2,361 70	.....	W. B. Thomas..	Patrick Durkin.	July 3
	2 ft. 6 in. × 1 ft. 8 in.	330.	3	6	75 00	.....	.....	st. c. 5.	1 50	7 50	1 55	.....	.....	.....	.....	.....	.....	.....
	2 ft. 8 in. × 1 ft. 6 in.	46.	.....	.....	.....	.....	.....	re-set 25.	20	5 00	1 52	.....	.....	.....	.....	.....	.....	.....
	12 in. v. p.	15.	.....	.....	.....	.....	.....	.....	.....	.....	1 00	.....	.....	.....	.....	.....	.....	.....
Thirtieth street, from Wharton st. to Latona st.	3 ft. × 2 ft.	231.	3	1	75 00	2	50 00	h. c. 244.	60	146 40	1 70	485 10	344 80	829 00	.....	George Moore.	D. A. Perna	Aug. 8
	2 ft. 6 in. × 1 ft. 8 in.	32.	4	1	45 00	.....	.....	.....	.....	.....	1 65	.....	.....	.....	.....	.....	.....	.....
	12 in. v. p.	18.	.....	.....	.....	.....	.....	.....	.....	.....	1 00	.....	.....	.....	.....	.....	.....	.....
Taney st., from South street to Bainbridge st..	2 ft. 6 in. × 1 ft. 8 in.	307.	.....	.....	.....	2	50 00	h. c. 140.	60	84 00	1 83	670 00	82 81	752 81	.....	George Moore..	J. L. Cunningham	Sept. 5
	12 in. v. p.	7.	.....	.....	.....	.....	.....	.....	.....	.....	1 00	.....	.....	.....	.....	.....	.....	.....

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.		MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.	
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.		Total cost.	In assessment bills.	In City warrants.					Total cost.
Tulip street, from Princeton st. to Tyson street....	2 ft. 6 in. × 1 ft. 8 in.	683.1	3	2	\$75 00	5	\$45 00				\$1 80		\$1,640 58	\$1,640 58	\$2,007 00	Jo n Bishop..	David Peoples..	Oct. 4
Tilton st., from Allegheny ave., to Westmoreland street.....	12 in. v. p.	36.									1 00							
	3 ft. × 2 ft.	705.5	3	1	75 00	6	50 00	h. c. 459.	80 60	\$275 30	1 49	\$1,738 60		1,738 60	3 24	B. Z. Lippincott.	E. Pascuzzi.....	Oct. 10
	12 in. v. p.	37.									1 00				261 63			
Twenty-third st., from Lehigh av. to Cambria st.	2 ft. 6 in. × 1 ft. 8 in.	1,056.94				8	50 00	h. c. 1,938.	60	1,144 80	1 42	2,415 00	647 65	3,062 65		G. M. Raphael	John J. Connor..	Oct. 27
	12 in. v. p.	17.									1 00							
Thomas avenue, from Fifty-third st. to W. C. & P. R. R.....	2 ft. 3 in. × 1 ft. 6 in.	460.02	2	1	80 00	3	35 00				2 10	676 95	561 00	1,238 04		W. J. Kiley....	J. McGlathey...	Nov. 21
	12 in. v. p.	12.	3	1	75 00						1 00							
	4 ft. circ.	377.	2	4	80 00	5	50 00	c. c. 98.6	2 25	221 85	6 40		7,375 10	7,375 10	2,300 80	J. D. Henderson	J. H. Louchheim	Nov. 28
	3 ft. circ. stone bl. inv.	626.	3	4	75 00			st. c. 30.	1 50	45 00	5 30							
	3 ft. circ.	25.						h. c. 140.	60	84 00	5 00							
	2 ft. 6 in. × 1 ft. 8 in. vit. sh. br. inv.	67.						excavation 8.60	50	4 35	2 00							
	2 ft. 6 in. × 1 ft. 8 in.	40.						conc rete 8.60	5 50	47 80	2 00							
	5 in. sub. drain	130.									25							

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assess- ment bills.	In City warrants.	Total cost.				
Twelfth st., from Dauphin st. to York street.....)	2 ft. 6 in. × 1 ft. 8 in.	526.56				3	\$35 00	h. c. 774.	\$0 50	\$387 00	\$1 73	\$1,329 25	\$73 70	\$1,402 95	Thos. Levens...	John Devlin, Jr.	Dec. 5	
Twenty-fourth st., fr'm Lehigh ave. to Cambria street.....)	2 ft. 6 in. × 1 ft. 8 in.	1030.5	2	2	\$80 00	6	50 00	c. c. 26.17 st. c. 72.	2 25	58 88	1 62	2,415 00	1,517 09	3,932 09	G. M. Raphael	J. Jafolla & Son.	Dec. 20	
	12 in. t. c. p.....	32.	3	4	75 00			h. c. 1978.	1 50	108 00	1 25							
	12 in. v. p.....	39.		2	35 00					60	1,186 80	1 00						
Uber street, from Callowhill st. to Shamokin st.....)	12 in. t. c. p.....	167.				2	45 00				2 54	276 69	237 49	514 18	John Doyle	Robt. P. Ryan	Sept. 5	
Umbria st., from Ripka st. to Leverington avenue.....)	2 ft. 3 in. circ. st. bl. inv. with 3 in. t. c. p.	202.	3	3	75 00	1	45 00	h. c. 350.	60	210 00	6 93	480 22	2,081 98	2,512 20	John Hare	J. F. McNichol.	Oct. 23	
	2 ft. 3 in. circ. st. bl. inv.....)	51.				1	55 00				6 33							
	8 in. t. c. p.....	47.75									5 33							
Windrim ave., from Broad st. to Twelfth st.....)	3 ft. 6 in. × 2 ft. 4 in.	1403.	2	3	80 00	9	85 00	c. c. 78.21 st. c. 18.	2 00	156 42	2 69		473 54	4,736 54	\$2,462 58	J. McCormick	David McMahon	Mar. 21
	15 in. v. p.....	5.	3	3	75 00				1 10.	19 80	1 25							

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Locations.	Size.	Length.	INLETS		MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.							
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.		Total cost.	In assess- ment bills.	In City warrants.					Total cost.						
Waverly street, from Twenty- first st. to 100 ft. westward	12 in. t. c. p.	117.	4	2	\$45 00	1	\$30 00	c. c. 22.83	\$2 00	\$45 66	\$2 11	\$176 83	\$287 30	\$464 13	D. S. Rorer	R. P. Ryan.....	Apl. 8							
						1	45 00	6.	1 10	6 60														
Webster st., from Eleventh st., to Twelfth st.	2 ft. 3 in. × 1 ft. 6 in.	388.	4	2	45 00	1	35 00				1 83	910 04		910 04	C. A. Crossin ..	Robt. Lombardi.	June 13							
						1	30 00											73 50						
						1	45 00																	
Walnut st., from Fifty-third st. to Fifty-eighth street	18 in. t. c. p.	2.						c. c.	20	35 00	1 67	6,252 51	6,252 51	67	H. W. Newton.	W. D. Stone.....	May 2							
								128.1										2 00	256 20					
								st. c.										1 10	19 80	1 67				358 55
								18.										20	3 28	1 25				
	16.4																							
	repaving	25																						
	7.																							
	excavation	50																						
	20.																							
	brick																							
	mas'y																							
	.33																							
	rubble																							
	mas'y																							
	5.																							

Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.		MAN-HOLES.		WELLHOLES, C. CURB, H. CON- NECTIONS, ETC.			Cost per foot.	PAYMENT.			Excess bills and balances.	Inspectors	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.		Total cost.	In assess- ment bills.	In City warrants.					Total cost.
Wissahickon ave., from King st. to Hans- berry st.	3 ft. circ. v. s. b. b. with 12 t. c.	30.	2	1	\$30 00	8	\$30 00	well hole 7.	\$7 00	\$30 00	\$3 21				B. Z. Lippin- cott.	A. D. McNeil	May 20
	3 ft. circ. vit. sh. b. b.	237.					15. st. c.	2 00	80 00	2 97		\$12 804	\$1208 04	\$49 95			
	2 ft. circ. vit. sh. b. b.	25.					12. h. c.	1 10	18 26	2 97							
	15 in. v. p.	2.					42. repaving	50	21 00	1 25							
							9. rubble mas onry excavation	25 8.3 16.6	2 25 4 50 8 30								
Watts st., from McKean st. to Snyder ave.	2 ft. 3 in. × 1 ft. 6 in.	402.	4	1	45 00	4	50 00	c. c. 11. reset	2 25	24 75	1 74	\$1,009 43	1,009 43	50	Joseph Hunter	W. A. Ryan	June 27
Walnut st., from Fifty-eighth st. to Fifty-ninth street	2 t. 3 in. × 1 ft. 6 in.	523.	3	1	75 00	4	50 00	12. h. c. 68.	20 60	2 40 37 80			109 50	Thos. Levens.	Robt. Lombardi	Aug. 28	
								c. c. 18.85 h. c. 1844	2 25 60	42 41 806 40	1 06	1,200 00	476 11				

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Length and Cost of Branch Sewers Built during the Year 1905—Continued.

Location.	Size.	Length in feet.	INLETS.			MAN-HOLES.		WELLHOLES, C. CURB, H. CONNECTIONS, ETC.			Cost per foot.	PAYMENT			Excess bills and balances.	Inspector	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In City warrants.	Total cost.				
Wilt street, from Memphis st. to Gaul street.....	3 ft. x 2 ft.....	419.	.....	.....	.....	4	\$50 00	h. c. 320.	\$0 80	\$192 00	\$1 70	\$1,048 49	\$55 81	\$1,104 30	.....	W. B. Thomas	Robt. Lombardi.	Oct. 17
Wilt street, from Willey st. to Girard ave.....	2 ft. 6 in. x 1 ft. 8 in.	277.	3	2	\$75 00	3	50 00	c. c. 11.5 h. c. 216.	2 25 60	25 88 129 60	1 71	757 21	171 94	929 15	.....	B. Z. Lippincott	E. Pascuzzi.....	Nov. 8
York road, from Rockland st. to Albanus st.....	2 ft. 6 in. x 1 ft. 8 in.	271.	.....	.....	.....	2	\$5 00	.....	.....	.....	3 00	601 89	281 11	\$886 00	.....	J. N. Brown....	Alfonso Zecca...	May 1

INTERESTED PARTIES,		Percentage of Work Completed Dec. 31, 1905	Amount Paid by the City Dec. 31, 1905.	Date of Final Estimate.
Limit of Payment by-	Amount Paid by- Dec. 31, 1905.			
		100.	\$53,063.43	February 27, 1905
		99.7	36,643.18	
		100.	77,587.80	November 6, 1905
\$16,000 by P. & R. R'y Co.....	\$15,305.47	100.	15,342.21	December 11, 1905
\$16,000 by Phila. Rapid Transit Co	\$15,305.47			
\$40,380 by Penna. R. R. Co.....	\$27,355.95	75.	42,787.50	
\$8,000 by P. & R. R'y Co...	\$5,154.14	90.	5,154.14	
		97.	25,220.00	

ANNUAL REPORT
OF THE
BUREAU OF STREET CLEANING
FOR THE
YEAR ENDING DECEMBER 31, 1905

OFFICERS
OF THE
BUREAU OF STREET CLEANING

Acting Chief,
WILLIAM C. FELTON.

Inspectors,

WILLIAM BUCHANAN,	HENRY S. MYERS,
AARON F. STULL,	EDWARD K. COLE,
THOMAS R. FIRTH,	DENNIS F. FITZGERALD,
JOHN F. SLATER,	ROBERT W. SCOTT,
JOSEPH MACIVER,	SAMUEL L. MOORE.

Clerk,

WILLIAM H. MCCOY.

Assistant Clerk,

WILLIAM H. JONES,

Messenger,

EDWARD G. STEARNE.

ANNUAL REPORT
OF THE
BUREAU OF STREET CLEANING
FOR THE YEAR 1905

Philadelphia, January 2, 1906.

A. LINCOLN ACKER, ESQ.,
Director, Department of Public Works.

SIR:—I have the honor to submit the following report of this Bureau for the year 1905, the eighteenth annual report of the Bureau:

The whole amount appropriated was.....	\$1,573,220 00
The whole amount expended was.....	1,538,345 01
Balance	\$34,874 99

Of this balance there was transferred to other Bureaus, \$32,608.44, leaving to merge into the City Treasury a balance of \$2,416.55.

There was deducted from the pay of contractors, for violations of contracts, \$19,678, in the cleaning districts, and \$2,718 in the garbage collection districts; making in all the sum of \$22,396.

The number of warrants drawn and countersigned was 428.

There were received from all sources 3,976 complaints, an increase over the previous year of 1,118, due entirely to close supervision, etc.

There were cleaned during the year 268,779.8 miles of streets on a basis of ten (10) squares to the mile, and

1,032,387 inlets. There were 123,966 private alleys cleaned, from which streets alleys and inlets there were removed *197,362 cart-loads of dirt. There were removed from buildings *802,392 cart-loads of ashes and *33,462 cart-loads of dry waste, and *344,901 cart-loads of garbage; making a grand total of matter removed of *1,378,117 cart-loads. There were also removed 23,580 dead animals, which were collected and disposed of with the garbage.

The net cost to the City for the above described work was \$1,538,345.01.

The cost for removal of snow during the year was \$19,538.85 of which amount \$420.75 remains to be paid for out of the appropriation for 1906. While such a material advance has been made in the method of handling the snow removed from the streets, the restricted area from which it was gathered, distinctly the centre of the City, was the cause of considerable dissatisfaction expressed on the part of citizens in other congested districts. The present system of doing the work is such a practical economy, it is to be regretted the appropriation limits the effort to one locality.

The entire cost to the City for the supervision of the work herein mentioned was \$28,591.71.

The contracts were awarded to the lowest bidders amounting to \$844,272 for the cleaning of streets, inlets and public market houses, and for the removal of ashes and household waste, and the sum of \$399,575 for the collection and disposal of kitchen garbage and dead animals for the year 1906.

The question of competition in the collection and disposal of garbage, etc., is one that could not be well met until proposals were asked for sufficiently early in the year to permit other than current interests to make bids.

With this idea in view, bids were asked for and opened on Monday, May 1. While the proposals then made were not satisfactory, and were ultimately rejected as being excessive, the result obtained amply justified the early date set for such proposals.

On this occasion the lowest bid was that of the Urban Waste Disposal Company, and the price \$444,000 was \$116,000 lower than that for this year.

Even with this considerable reduction, the rejection of the bids made under the above date found justification in the subsequent letting.

On July 13, bids were again opened for collection of garbage, etc. Three bidders appeared, and of these, the Penn Reduction Company, was the lowest, at a price of \$399,575 and the contract was subsequently awarded to them.

This early bidding, with a saving of \$160,425 makes clear the assurance of some competition when ample time is given to prospective bidders.

A somewhat similar condition obtained in connection with the letting for cleaning streets, removal of ashes, etc. Bids were first advertised to be opened on August 23, and the price for the entire City by districts was \$917,485, a saving of \$32,515 when compared to price for 1905. These bids were rejected as being altogether too high, and another letting was made under date of September 18, when the price for the entire City was \$844,272, or \$105,728 lower than in 1905. This considerable reduction came in the face of the fact that the usual division of the City's streets into six (6) districts was subdivided into eleven (11) districts, thus giving ample opportunity to smaller contractors to make bids, and even in view of additional work required by specifications for 1906, and many new causes assigned for the imposing of penalties. In these

two instances, open competitive bidding amply proved its justification.

The collection and disposition of household waste is both an educational and economic problem in that the first need lies in the necessity of convincing householders that such waste should be placed out separate and apart from ashes. Such waste is an economy in the broad workings of the City in that much of such material can be used for steaming purposes in any of the municipal plants at a comparatively small expense in the way of making necessary changes.

Such efforts are no longer experimental, but practical. The best evidence of this is the free and successfully working plants now in operation in New York—a plant is located there under the Williamsburg Bridge. This plant furnishes the power for lighting entire, that great public work, and preparations are being made to use the additional power at command to light thirteen (13) school houses. The actual cost of this to the City of New York is \$11.

The nominal figures given as to cost are due to the fact that the City derives a revenue from this waste by the materials saved in trimming. Pickers follow the waste over an endless carrier, gather what is available and the remainder is used under boilers for steaming purposes.

With the idea of securing some such revenue for this City, I desire to recommend that the privilege of gathering such waste be advertised for 1907, to begin at conclusion of existing contracts for 1906 and an award made to the highest bidder.

The cleaning of streets at night, separate and distinct from the regular day cleaning is a matter requiring consideration. This need is particularly evident in localities where any considerable hauling is done. So much of this

hauling is done at, or near the close of the working day, and debris and droppings littering the streets on such thoroughfares is unsightly, unsanitary, and not exactly in keeping with advanced modern methods of street cleaning. When a remedy is so easily found and the cost not a serious one, little reason exists for not embodying such recommendations in subsequent specifications.

Sprinkling streets during the warmer months is a comparative new problem being worked in season over a small area, amply justifying its extension to include many other business and frequently traveled sections. This benefit is restricted to the centre of the City, and many applications have been made to have the service materially extended. That such benefits should be more general is evident when consideration is given to the fact that there are at least half a dozen localities where retail business is carried on extensively, and the damage of goods through blowing of fine dust through open doors is quite considerable.

To great advantage also, would be the flushing of streets where and when necessary during the period of year weather so permits, and when supply of water is in no wise restricted. In particular, such work could be done in that part of the City bounded by Race and Walnut streets, Sixteenth street and the Delaware river. In this district, congested during the day by travel and business, the accumulations are much greater than elsewhere, and the flushing could be done at night.

The cost of cleaning streets including the cleaning of alleys and inlets and the removal of ashes and household waste during the year was \$3.53 per running mile. This proportionate increase in price over 1904, was due to weather conditions, in that during the months of January, February and March, the streets were constantly covered with ice and snow, making their proper cleaning impossible

under such conditions, the work of contractors was confined almost exclusively to keeping intersections clean, and the gutters and inlets open for proper drainage of surface water.

I desire to recommend the absolute necessity of a greatly increased amount of cleaning in the Tenth, Eleventh, Fifth, the Eighth and Ninth districts, for 1906. Much of the territory embodied in these districts is now built solidly, and I can appreciate the frequent demands of the citizens that they be given the same consideration in municipal expenditure as is given other localities, and particularly where no stated reasons exist for any such discrimination. Over many miles of streets the specifications call for cleaning but twice each week, and no discretion is given to me as to what days they are to be cleaned, and the result is too often anything but satisfactory.

Reports from other Bureaus show that there have been added during the year 10,024 new buildings, 14.91 miles of new streets, and 503 new inlets, making to date 327,147 buildings, 987.99 miles of streets and 21,724 inlets. There are also 670 inlets built by private interests not yet turned over to the City, which are cleaned by contract.

Further information will be found in detail in the accompanying schedules:

- A. Appropriations and expenditures.
- B. and C. Work done by contractors.
- D. Statement of complaints.
- E. Statement of deductions.

Transmitted herewith is a copy of the specifications for 1906.

I desire to express my appreciation of the assistance given me by all the employees of this Bureau and to thank

you for the very substantial support given all my suggestions and efforts, and the hearty approval accorded after substantial results had been accomplished in holding the contractors to a strict compliance with the specifications.

Yours respectfully,

WILLIAM C. FELTON,

Acting, Chief of Bureau.

SCHEDULE "A".

Appropriations and Expenditures during the year 1905.

Item.	For.	Appropriation.	Expended.	Balance merging.
1	Officers' salaries	*\$24,043 12	\$23,249 45	\$793 67
2	Horses and carriages for Chief of Bureau and Inspectors.....	*5,476 34	5,342 26	134 08
3	Printing, stationery and incidentals.....	†750 00	750 00	
4	Cleaning streets, etc.....	*931,702 00	930,322 00	1,380 00
5	Removing garbage, etc.....	*557,372 00	557,282 00	90 00
6	Removing snow, sprinkling streets, etc.....	*21,418 10	21,399 30	18 80
	Total appropriation	\$1,540,761 56	\$1,538,345 01	2,416 55
	*Transferred from			
	{ Item 1... \$76 88			
	{ Item 2... 23 66			
	{ Item 4... 18,298 00			
	{ Item 5... 2,628 00			
	{ Item 6... 11,581 90			
	†Transferred from \$32,608 44			
	Transferred to			
	Item 3..... 150 00			
	150 00			
	Transferred from . \$32,458 44	32,458 44		
		\$1,573,220 00	\$1,538,345 01	\$2,416 55

SCHEDULE "B"—Total Amount of Work Done During the Year 1905.

Month	Squares	CLEANED.						REMOVED				FORCES EMPLOYED				Rain or Snow, Number of Days	Number of Com plaints
		Alleys.	Inlets.	Crossings.	Market Houses.	Snow from Fire Plugs	Number of Dead Animals	† NUMBER OF LOADS				Men	Machines	Carts	Garbage Carts		
								Dirt	Ashes	Dry Waste	Garbage						
January.....	110,520	3,155	64,781	117,814	146	8,038	1,918	11,060	60,485	2,018	82,021	25,237	303	16,692	9,750	16	247
February.....	2,517	.....	79,580	511,042	118	13,945	1,860	1,566	82,144	2,883	30,510	23,683	1	20,738	9,706	24	190
March.....	208,418	6,981	104,14	39,941	130	547	2,476	21,884	112,190	3,706	36,199	23,815	448	2,343	12,089	13	789
April.....	246,660	11,911	79,728	.....	138	.....	2,145	21,236	86,318	2,674	20,881	24,151	711	20,895	9,669	15	208
May.....	247,124	11,757	82,508	.....	144	.....	2,018	17,176	72,304	2,605	30,162	24,288	898	20,846	9,672	11	282
June.....	310,078	14,821	100,106	.....	156	.....	2,598	19,416	70,310	3,385	34,159	80,895	1148	26,493	11,529	10	481
July.....	236,245	11,869	78,086	.....	136	.....	1,488	15,558	46,607	2,456	21,629	24,315	898	20,892	11,278	6	369
August.....	247,540	11,911	82,327	.....	144	.....	1,659	16,691	46,302	2,521	26,109	24,521	907	21,074	13,528	9	265
September.....	307,718	14,669	101,276	.....	180	.....	2,095	20,390	57,114	3,159	31,819	30,652	1140	26,341	15,993	5	247
October.....	246,500	12,379	81,179	.....	144	.....	1,670	16,581	46,058	2,521	34,081	24,517	911	21,066	10,610	5	294
November.....	310,103	14,717	101,696	.....	174	.....	2,004	20,250	66,051	3,141	20,970	30,397	1,120	26,350	10,707	8	343
December.....	216,375	10,396	77,024	37,379	138	.....	1,623	14,645	55,514	2,388	17,061	23,761	765	20,614	8,669	7	261
Total.....	2,067,798	123,986	1,632,367	706,175	1,798	22,525	23,580	197,382	802,392	33,462	844,901	316,208	9,228	268,359	133,100	124	3,976

* A square covers about 500 feet in length, with an average width of roadway of 26 feet.
 † A cartload of ashes and of street dirt is equal to one cubic yard; a cartload of garbage is equal to one ton.

SCHEDULE "C".—Total Amount of Work done by Districts during the year 1905.

Districts.	CLEANED.							REMOVED.					FORCES EMPLOYED.				AMOUNT OF CONTRACTS.		
	Squares.	Alleys.	Inlets.	Crossings.	Market houses.	Snow from fire plugs.	Number of dead animals.	*NUMBER OF LOAD.			Men.	CLEANING STREETS, REMOVING ASHES.		Garbage carts.	Cleaning streets for entire City.	Removing garbage for entire city.	Totals.		
								Dirt.	Ashes.	Dry waste.		Garbage.	Ma-chines.					Carts.	
First	589,806	26,772	246,627	146,388	600	5,305	4,265	86,962	161,382	7,033	39,079	1,245	50,872	17,186					
Second	414,241	26,481	282,163	186,260	1,186	5,238	4,510	41,830	129,171	7,069	58,264	2,011	50,877	22,438					
Third	432,722	20,042	117,081	131,851	2	2,094	5,085	34,569	139,390	5,838	88,584	905	30,581	28,052	\$560,000 00	\$560,000 00			
Fourth	645,879	23,298	154,200	141,749		3,288	5,030	37,193	179,407	6,189	90,001	2,813	60,179	32,023					
Fifth	589,588	27,003	216,359	135,690		4,105	4,690	35,002	193,092	7,213	73,073	1,950	63,016	33,401					
Sixth	22,582		15,948	14,318		1,375		11,506				214	3,834						
Totals, 1905	2,857,798	123,906	1,032,367	706,175	1,798	22,525	23,590	197,162	802,392	33,462	344,901	316,298	268,359	135,100	950,000 00	560,000 00	\$1,510,000 00		
Totals, 1904	2,945,011	165,306	1,110,568	755,219	2,199	25,128	34,949	230,271	644,973	29,737	880,520	352,031	294,422	116,040	981,190 00	538,700 00	1,517,890 00		
Totals, 1903	2,302,208	158,074	1,083,759	219,642	2,144	6,100	17,513	218,928	639,423	27,949	301,643	8,414	218,367	99,868	693,850 00	516,700 00	1,210,550 00		
Totals, 1902	1,869,322	115,090	1,009,731	373,255	2,142	14,528	17,032	189,735	617,947	29,063	279,333	301,474	201,436	106,041	720,890 00	488,900 00	1,210,790 00		

*A cartload of ashes and of street dirt is equal to one cubic yard; a cartload of garbage is equal to one ton.

SCHEDULE "D".

Statement of Complaints received from all sources during the year 1905.

	Garbage.	Dead animals.	Ashes.	Household waste.	Streets.	Alleys.	Inlets.	Totals.	Removed by contractors.	Referred to other Bureaus.	Unfounded.
First	38	16	15	1	275	150	76	571	512	81	28
Second	142	86	128	13	673	82	246	1820	1170	52	98
Third	146	10	57	4	358	49	70	694	654	8	32
Fourth.....	64	13	78	3	331	81	149	769	672	44	53
Fifth.....	79	5	42	5	245	84	61	521	446	42	33
Broad street					96		5	101	99	1	1
Totals, 1905.	469	80	320	26	2028	446	607	3976	3553	178	245
Totals, 1904.....	403	66	357	22	1121	405	484	2858	2388	120	350
Totals, 1903.....	455	56	385	17	2017	686	603	4169	3631	180	358
Totals, 1902.....	481	37	264	7	937	531	496	2703	102	102	340

Sources of Complaints.

	Garbage	Dead animals.	Ashes.	Household waste.	Streets.	Alleys.	Inlets.	Totals.
Director's office	121	3	109	3	332	58	115	741
Direct to office.....	348	77	211	23	1696	388	492	3235
Totals	469	80	320	26	2028	446	607	3976

SCHEDULE "E".

Penalties Imposed for Violation of Contracts.

MONTHS.	Amounts.	DISTRICTS.	Amounts.
January	\$772	Street Cleaning.	
February.....	2,779		
March.....	1,466	First.....	\$1,095
April.....	2,068	Second.....	4,303
May.....	1,281	Third.....	3,019
June.....	3,938	Fourth.....	6,647
July.....	976	Fifth.....	3,265
August.....	780	Sixth.....	859
September.....	666	Total Street Cleaning..	\$19,678
October.....	2,627	Garbage.	
November.....	3,763	First.....	\$195
December.....	1,280	Second.....	1,077
		Third.....	459
		Fourth.....	425
		Fifth.....	562
		Total Garbage.....	\$2,718
Totals for year.....	\$22,396	Total Street Cleaning and Garbage.....	\$22,396

ANNUAL REPORT

OF THE

BUREAU OF LIGHTING

FOR THE

YEAR ENDING DECEMBER 31, 1905.

437

OFFICERS
OF THE
BUREAU OF LIGHTING

Chief,
JOHN J. KIRK.

Chief Clerk,
JOHN J. HOERR.

Clerk,
Vacant.

Inspectors,
JOHN H. HOPKIN,
PETER H. SMITH,
DAVID F. LARE,
FRANK JACOBI.

ANNUAL REPORT
OF THE
BUREAU OF LIGHTING
FOR THE YEAR 1905

Philadelphia, December 31, 1905.

A. LINCOLN ACKER., Esq.,
Director, Department of Public Works.

DEAR SIR:—I have the honor herewith to present this the seventeenth Annual Report of the Bureau of Lighting for the year ending December 31, 1905.

The appropriation to this Bureau for the year 1905, was \$400,119; transferred from this amount \$700; leaving the appropriation \$399,419; of this amount \$398,582.58 was expended and \$836.42 merged.

For salaries (Item 1) there was appropriated \$8,900; transferred from this amount \$500; leaving the appropriation \$8,400; of this amount \$8,326.62 was expended and \$73.38 merged.

For keep of horses and wagons (Item 2) there was appropriated \$2,400; transferred from this amount \$200; leaving the appropriation \$2,200; of this amount \$2,199.98 was expended and \$.02 merged.

For incidentals (Item 3) there was appropriated \$300; expenditures \$185.43 and \$114.57 merged.

For gasoline lighting (Item 4) there was appropriated \$380,019; expenditures \$379,427.26 and \$591.74 merged.

For new gasoline lamps (Item 5) there was appropriated \$7,000; expenditures \$6,950.14 and \$49.86 merged.

For lighting the Northern Liberties District (Item 6) there was appropriated \$1,500; expenditures \$1,493.15 and \$6.85 merged.

During the year there was received by this Bureau the sum of two thousand fifty (2,050) dollars; this was due to the sale of 4,100 of the old style lanterns which were removed on account of the introduction of the Welsbach incandescent lamps.

The number of public lights of all kinds on December 31, 1905, was as follows:

Gas lamps	22,049
Gasoline lamps	13,454
Electric lights	10,968
	46,471

The number of public lights of all kinds on January 1, 1905, was as follows:

Gas lamps	21,749
Gasoline lamps	12,870
Electric lights	10,459
	45,078
Increase during the year 1905 of.....	1,393

This is an increase of 300 gas lamps, 584 gasoline lamps and 509 electric lights.

Of the number of electric arc lights, 70 along Delaware avenue and Front street, from Vine to South street, are maintained by the Board of Directors of the City Trusts free of cost to the City, and 103 free electric arc lights are maintained by the different electric lighting companies for privileges granted. Two hundred and thirty-one (231) gas lamps are maintained by the Bureau of Correction at Tacony and Holmesburg, of which 132 are lighted and 99 are dead or discontinued lamps. One hundred and twenty-

one (121) dead or discontinued gas lamps are maintained by the United Gas Improvement Company.

The number of lamps lighted and under the immediate supervision of this Bureau on January 1, 1905, number added and discontinued during the year and total number on December 31, 1905, was as follows:

Gas lamps maintained by the United Gas Improvement Company January 1, 1905.....	21,323	
Added during the year.....	875	
		22,198
Discontinued during the year.....	574	
		21,624
Gasoline lamps maintained by the Pennsylvania Globe Gas Light Company January 1, 1905.....	12,870	
Added during the year.....	747	
		13,617
Discontinued during the year.....	163	
		13,454
Gas lamps maintained by the Northern Liberties Gas Company, January 1, 1905.....	74	
Discontinued during the year.....	1	
		73
Total number of lighted lamps on December 31, 1905.	35,151	
Total number of lighted lamps on January 1, 1905...	34,267	
Increase of lighted lamps under supervision of the Bureau during the year.....	884	

The following statement will show the number of locations for new gas lamps returned by the Directors, Department of Public Works, to the United Gas Improvement Company, with the erections and balance to erect from December 1, 1897 (date of lease) to December 31, 1905, viz:

Number of locations for new lamps returned to the U. G. I. Co., from Dec. 1, 1897 to Dec. 31, 1904.....	2,143
Locations of new lamps returned during the year 1905...	259
Total number of locations for new lamps returned from Dec. 1, 1897 to Dec. 31, 1905.....	2,402

Number of new lamps erected from Dec. 1, 1897 to Dec. 31, 1904.....	2,095
Number of new lamps erected during the year 1905	302
	<hr/>
Total number of new lamps erected from Dec. 1, 1897 to Dec. 31, 1905.....	2,397
	<hr/>
Balance of new lamps remaining to erect on Dec. 31, 1905	5

During the year there were 566 gas lamps recommended by the Chief of the Bureau to be discontinued on account of their proximity to electric arc lights and other causes. These were returned by the Director, Department of Public Works, to the United Gas Improvement Company for removal and relocation.

The following statement will show the number of lamps returned by the Director, Department of Public Works, to the United Gas Improvement Company to discontinue and relocate from December 1, 1897 (date of lease) to December 31, 1905; number discontinued and removed, erected and balance to remove and erect, viz:

Number of lamps returned to be discontinued and re- located from Dec. 1, 1897 to Dec. 31, 1904.....	4,152
Number of lamps returned to be discontinued and re- located during the year 1905.....	566
	<hr/>
Total number of lamps returned to be discontinued and relocated from Dec. 1, 1897 to Dec. 31, 1905.....	4,718
Number of discontinued lamps relocated and erected from Dec. 1, 1897 to Dec. 31, 1904.....	4,095
Number of discontinued lamps relocated and erected during the year 1905.....	573
	<hr/>
Total number of discontinued lamps relocated and erected from Dec. 1, 1897 to Dec. 31, 1905.....	4,668
	<hr/>
Balance of discontinued lamps remaining to relocate and erect on Dec. 31, 1905.....	50

The following statement will show the number of gas lamps under the care of the United Gas Improvement Company on January 1, 1905; number of new lamps erected, number relocated, number discontinued and removed, dead or discontinued lamps still remaining and number of lighted lamps on December 31, 1905, viz:

Number of lamps under the care of the U. G. I. Co., on		
January 1, 1905.....	21,444	
Number of new lamps erected.....	302	
Number of discontinued lamps relocated and erected	573	875
		<hr/>
		22,319
Number of lamps discontinued and removed.....	574	
Number of dead or discontinued lamps still remaining	121	695
		<hr/>
Number of lighted lamps on December 31, 1905.....		21,624

On December 1, 1897, date of lease by the City of Philadelphia to the United Gas Improvement Company of the City Gas Works, the care and maintenance of the gas lamps of the City were transferred to said company.

The work performed by this Bureau since the transfer to the United Gas Improvement Company has been a general supervision of the work to be performed by said company; the location of all new lamps, discontinuances, removals and relocations of lamps are furnished by this Bureau through the Director's office to said company.

The work done by them has been entirely satisfactory, the lamps lighted and extinguished regularly and kept in good repair, and all complaints received prompt attention.

The Northern Liberties Gas Company, under contract with the City of Philadelphia at \$20.20 per lamp per year, lighted and maintained on January 1, 1905, 74 gas lamps. During the year there was one lamp discontinued and removed on account of its proximity to an electric light, leaving 73 lamps lighted by said company on December 31, 1905.

Under specifications prepared by the Bureau, bids for lighting the incandescent naphtha lamps of the City during the year 1905, were advertised for on August 25, 1904, and were opened by the Director, Department of Public Works, on September 6, 1904.

There was but one bid submitted, that of the Pennsylvania Globe Gas Light Company, which was as follows:

For all incandescent naphtha lights in the City of Philadelphia:

Lamps of sixty (60) candle power guaranteed, twenty nine (29) dollars and fifty (50) cents per lamp per year.

First District: Lamps of sixty (60) candle power guaranteed, twenty-nine (29) dollars and fifty (50) cents per lamp per year.

Second District: Lamps of sixty (60) candle power guaranteed, twenty-eight (28) dollars and fifty (50) cents per lamp per year.

Third District: Lamps of sixty (60) candle power guaranteed, thirty-two (32) dollars per lamp per year.

Fourth District: Lamps of sixty (60) candle power guaranteed, thirty-two (32) dollars per lamp per year.

Fifth District: Lamps of sixty (60) candle power guaranteed, thirty (30) dollars per lamp per year.

The contract awarded said company by the Director on November 10, 1904, for all the incandescent naphtha lamps in the City at twenty-nine (29) dollars and fifty (50) cents per lamp per year.

The following statement will show the number of Welsbach incandescent naphtha lamps on January 1, 1905, number discontinued on account of the erection of electric lights, gas lamps erected and other causes, number relocated to other locations, together with the addition of the new Welsbach incandescent naphtha lamps located by resolution of Councils, March 23 and December 21, 1905, and

the total number of Welsbach incandescent naphtha lamps on December 31, 1905, viz:

Number of Welsbach incandescent naphtha lamps on		
January 1, 1905.....		12,870
Number discontinued during the year.....		163
		12,707
Number relocated during the year.....	172	
Number located and erected by resolution of Councils		
Mar. 23, and Dec. 21, 1905.....	575	747
		747
Total number of Welsbach incandescent naphtha lamps,		
December 31, 1905.....		13,454

There was located by resolution of Councils, March 23, 1905, 592 lamps; of thos number 575 were erected and 33 were not erected for various causes. By resolution of Councils, December 21, 1905, 16 of these 33 lamps were transferred to other locations and erected, leaving 17 lamps which could not be erected for the following reasons:

Located where lamps were up.....	5
Locations could not be found.....	2
Located too close to electric lights.....	3
Located too close to lamps up.....	1
Repetition in ordinance	4
Location not definite.....	2
Total	17

In closing this report, permit me to acknowledge the aid you have afforded me in my efforts to administer the affairs of this Bureau. My thanks are also due to my subordinates for the fidelity with which they have discharged the duties of their several positions.

For further information permit to refer you to the accompanying tables.

Respectfully submitted,

JOHN J. KIRK,

Chief of Bureau.

Summary of Appropriation—Bureau of Lighting.

Item.		Appropriation.	Expenses.	Unexpended	Transferred.	Merging.
1	Salaries.....	\$8,900.00	\$8,326.62	\$73.38	\$500.00	\$73.38
2	Keep of horses and wagons.....	2,400.00	2,199.98	.02	200.00	.02
3	Incidentals.....	300 00	185.43	114.57	.....	114.57
4	Gasoline lighting....	380,019.00	379,427.26	591.74	.....	591.74
5	New gasoline lamps	7,000.00	6,950.14	49.86	.....	49.86
6	Lighting Northern liberties District...	1,500.00	1,493.15	6.85	.....	6.85
		\$400,119.00	\$398,582.58	\$836.24	\$700.00	\$836.42

DETAIL OF EXPENDITURES.

Bureau of Lighting.

Salaries	\$8,326 62
Keep of horses and wagons.....	2,199 98
Cleaning office, stationery, etc.....	185 43
Penna. Globe Gas Light Company.....	386,377 40
Northern Liberties Gas Company.....	1,493 15
Total	\$398,582 58

Receipts.

By City Treasurer:

From Bureau of Lighting..... \$2,050 00

*Statement Showing the Number of Each Kind of Lamps
at the Beginning of the Year, Additions,
Discontinuances, etc.*

	Number of lamps Jan. 1905.	Additions.	Discontinuances.	Number of lamps Dec. 31, 1905.
Number of lamps maintained by the U. G. I. Co.....	21,444	875	574	21,745
Contract with the Northern Liberties Gas Company.....	74	.....	1	78
Number of lamps maintained by the Bu- reau of Correction.....	231	.....	.....	231
Number of gasoline lamps.....	12,870	747	168	18,454
Number of electric lights.....	10,459	509	.....	10,968
	45,078	2,181	738	46,471

Of the number of gas lamps maintained by the United Gas Improvement Company during the year 1905, there were not lighted because of proximity to electric lights 121

Of the number of gas lamps maintained by the Bureau of Correction during the year 1905, there were not lighted because of proximity to electric lights..... 99

Statement showing the number of gas lamps lighted and maintained by the United Gas Improvement Company, December 1, 1897; number discontinued and removed, relocation and new erections by wards, to December 31, 1905.

Wards.	Number of Lamps, Dec. 1st, 1897.	Discontinued and Removed since Dec. 1, 1897.	Relocated since Dec. 1, 1897.	New Erections since Dec. 1, 1897	Number of Lamps lighted Dec. 31, 1905.
First	573	105	24	24	516
Second	243	87	4	....	160
Third	52	28	....	....	24
Fourth.....	68	26	....	....	42
Fifth.....	187	23	3	1	168
Sixth	108	35	1	....	74
Seventh.....	265	95	15	16	201
Eighth.....	298	105	7	6	206
Ninth.....	122	68	6	1	61
Tenth.....	259	106	5	....	158
Eleventh	1	....	....	....	1
Twelfth.....	0	....	....	....	0
Thirteenth	106	49	2	1	60
Fourteenth.....	141	81	....	3	63
Fifteenth.....	636	174	18	7	487
Sixteenth	33	14	....	....	19
Seventeenth	85	43	1	....	43
Eighteenth.....	309	114	12	11	218
Nineteenth	572	274	71	10	379
Twentieth.....	468	213	4	2	261
Twenty-first.....	994	129	27	24	916
Twenty-second.....	2540	225	277	169	2761
Twenty-third.....	475	88	32	50	469
Twenty-fourth.....	1089	192	110	47	1054
Twenty-fifth.....	727	142	253	270	1108
Twenty-sixth	618	158	123	67	650

Statements showing the number of gas lamps lighted, etc.—
Continued.

Ward.	Number of Lamps, Dec. 1, 1887.	Discontinued and Removed since Dec. 1, 1887.	Relocated since Dec. 1, 1887.	New Erections since Dec. 1, 1887.	Number of Lamps lighted Dec. 31, 1888.
Twenty-seventh.....	822	241	392	292	1265
Twenty-eighth.....	785	148	168	71	876
Twenty-ninth.....	845	227	44	14	676
Thirtieth.....	264	181	12	9	154
Thirty-first.....	361	169	23	16	281
Thirty-second.....	449	144	19	1	325
Thirty-third.....	1010	222	680	806	1724
Thirty-fourth.....	822	163	1012	478	2209
Thirty-fifth.....	7	....	6	....	13
Thirty-sixth.....	735	138	241	131	974
Thirty-seventh.....	329	121	44	14	266
Thirty-eighth.....	754	105	189	75	913
Thirty-ninth.....	587	134	175	70	708
Fortieth.....	286	94	349	114	655
Forty-first.....	0	....	....	....	0
Forty-second.....	124	54	369	97	536
Totals.....	19219	4660	4668	2397	21624

Monthly statement of gas lamps lighted by the United Gas Improvement Company from January 1, 1905, to December 31, 1905, showing the number of removals, relocations and new erections.

Months.	Number of Lamps.	Removed during the Year.	Relocated during the Year.	New Erections during the Year.	Total Number of Lamps Lighted.
January	21,323	15	7	19	21,384
February.....	21,334	.....	1	1	21,336
March.....	21,336	1	1	4	21,340
April.....	21,340	16	10	67	21,401
May.....	21,401	16	20	69	21,474
June.....	21,474	8	7	51	21,524
July.....	21,524	12	36	24	21,572
August.....	21,572	109	88	16	21,567
September.....	21,567	73	68	10	21,572
October.....	21,572	123	132	24	21,600
November.....	21,600	141	143	5	21,607
December.....	21,607	55	60	12	21,624
Total, December 31, 1905.....		574	573	302	21,624

Number of Posts, number lighted, not lighted; number of Burners, number lighted, not lighted, in Public Squares.

Squares.	Number of Posts.	Number of Posts.		Number of Burners.	Number of Burners.	
		Lighted.	Not Lighted.		Lighted.	Not Lighted.
Jefferson	16	4	12	32	8	24
Washington	51	14	37	71	28	43
Independence	41	28	13	61	43	18
Franklin	22	11	11	44	22	22
Logan	26	25	.....	50	50	2
Rittenhouse	24	24	.....	48	48	.....
Ontario	8	8	.....	24	24	.....
Passyunk	16	11	5	32	22	10
Wharton	12	12	.....	36	36	.....
Fairhill	8	.....	8	8	.....	8
Norris	15	.....	15	30	.....	30
Fitler	4	4	.....	12	12	.....
Allegheny	22	22	.....	22	22	.....
Fottéral	32	32	.....	32	32	.....
Total	297	195	101	502	347	157

Monthly Statement Showing the Number of Lamps Lighted and Number Discontinued and Removed in the Northern Liberties District.

Months.	Number of Lamps	Discontinued on Account of Electric Light	Total
January.....	74	.....	74
February.....	74	.....	74
March.....	74	.....	74
April.....	74	.....	74
May.....	74	.....	74
June.....	74	.....	74
July.....	74	.....	74
August.....	74	.....	74
September.....	74	.....	74
October.....	74	.....	74
November.....	74	1	73
December.....	78	.....	73
Total lighted December 31, 1905.....	.....	1	73

Statement showing the number of Welsbach Gasoline Lamps on January 1, 1905; number discontinued, relocated and new erections to December 31, 1905, by Wards.

Wards.	Number of Lamps, Jan. 1, 1905.	Discontinuances.	Relocations.	New Erections.	Total Number of Lamps, Dec. 31, 1905.
First.....	206	1		3	208
Second.....	145			6	151
Third.....	95		2	32	129
Fourth.....	125	1	1	8	133
Fifth.....	60		1		61
Sixth.....	29				29
Seventh.....	160	3	1	2	160
Eighth.....	82	5	1	5	83
Ninth.....	20	1		3	22
Tenth.....	64		1	3	68
Eleventh.....	83		1	1	85
Twelfth.....	104		2		106
Thirteenth.....	55				55
Fourteenth.....	93	1		5	102
Fifteenth.....	210	3		3	210
Sixteenth.....	108			6	114
Seventeenth.....	137	2		4	139
Eighteenth.....	200	6	1	19	223
Nineteenth.....	439	6	5	10	448
Twentieth.....	335			9	344
Twenty-first.....	558	5	5	26	584
Twenty-second.....	565	12	10	5	568
Twenty-third.....	262	3	2	21	282
Twenty-fourth.....	365	4	5	16	382
Twenty-fifth.....	432	5		24	451
Twenty-sixth.....	378	1	6	7	390
Twenty-seventh.....	164	8	10	43	209

Statement showing the number of Welsbach Gasoline Lamps.
Continued.

Wards.	Number of Lamps, Jan. 1, 1905.	Discontinu-ances.	Relocations.	New Erections.	Total Number of Lamps, Dec. 31, 1905.
Twenty-eighth	354	1	1	16	370
Twenty-ninth.....	434		1	25	460
Thirtieth.....	173		1	8	182
Thirty-first.....	350		8	16	374
Thirty-second.....	344		2	16	362
Thirty-third	635	9	15	37	728
Thirty-fourth	480	40	22	19	481
Thirty-fifth	1,151	10	7	52	1,200
Thirty-sixth	386	4	1	28	411
Thirty-seventh.....	222		1	10	233
Thirty-eighth	292	3	21	18	328
Thirty-ninth	531	6	5	9	539
Fortieth	694	5	16	29	734
Forty-first.....	301	10	5	10	306
Forty-second.....	895	8	12	21	920
Total.....	12,870	163	172	575	13,454

Monthly statement of Welsbach Gasoline Lamps, number discontinued, number relocated and new erections from January 1, 1905 to December 31, 1905.

Months.		Discontinued during the month.	Relocated during the month.	New erections during the month.	Total number.
January.....	12,870	2	11	.....	12,879
February.....	12,879	2	2	.....	12,879
March.....	12,879	1	1	.....	12,879
April.....	12,879	6	7	39	12,919
May.....	12,919	40	12	7	12,898
June.....	12,898	34	33	9	12,906
July.....	12,906	17	32	12	12,933
August.....	12,933	15	26	492	13,436
September.....	13,436	9	9	.....	13,436
October.....	13,436	20	16	.....	13,432
November.....	13,432	10	15	.....	13,437
December.....	13,437	7	8	16	13,454
Total.....	.....	163	172	575	13,454

Statement of Welsbach Gasoline Lamps located by resolution of Councils, March 23, and December 21, 1905, showing the number located, number erected and number not erected, by Wards.

Wards,	Located.	Erected.	Not Erected.	Wards.	Located.	Erected.	Not Erected.
First.....	8	8		Twenty-third.	21	21	
Second.....	6	6		Twenty-fourth.....	16	16	
Third.....	42	32	10	Twenty-fifth.....	24	24	
Fourth.....	12	8	4	Twenty-sixth.....	7	7	
Fifth.....				Twenty-seventh....	43	43	
Sixth.....				Twenty-eighth.....	16	16	
Seventh.....	2	2		Twenty-ninth.....	25	25	
Eighth.....	5	5		Thirtieth.....	9	8	1
Ninth.....	3	3		Thirty-first.....	16	16	
Tenth.....	3	3		Thirty-second.....	16	16	
Eleventh.....	1	1		Thirty-third.....	30	37	2
Twelfth.....				Thirty-fourth.....	19	19	
Thirteenth.....				Thirty-fifth.....	52	52	
Fourteenth.....	5	5		Thirty-sixth.....	28	23	
Fifteenth.....	3	3		Thirty-seventh.....	10	10	
Sixteenth.....	6	6		Thirty-eighth.....	18	18	
Seventeenth.....	4	4		Thirty-ninth.....	9	9	
Eighteenth.....	19	19		Fortieth.....	29	29	
Nineteenth.....	10	10		Forty-first.....	10	10	
Twentieth.....	9	9		Forty-second.....	21	21	
Twenty-first.....	26	26					
Twenty-second.....	5	5		Total.....	592	575	17



ANNUAL REPORT

OF THE

BUREAU OF GAS

FOR THE

YEAR ENDING DECEMBER 31, 1905



OFFICERS
OF THE
BUREAU OF GAS

Chief Inspector of Meters.

DR. N. WILEY THOMAS.

First Assistant Meter Inspector,

JOHN S. STEWART.

Second Assistant Meter Inspector,

ALEXANDER McCAULEY.

Clerk and Assistant Inspector,

ALBERT C. JOHNSTON.

Photometer Inspector,

STEPHEN B. OTIS.

Messenger and Assistant Inspector,

BENJAMIN INGRAM.

ANNUAL REPORT
OF THE
BUREAU OF GAS
FOR THE YEAR 1905

Philadelphia, January 11, 1906.

A. LINCOLN ACKER, Esq.,
Director, Department of Public Works.

MY DEAR SIR:—I have the honor to submit herewith, the report of the Bureau of Gas, for the year ending December 31, 1905.

The appropriations and expenditures were as follows:

Appropriations for 1905	\$10,000 00
Expenditures for 1905	9,985 88
Balance	<u> </u> \$14 12

The gas industry is in a constant state of elaboration, the manufacture of the product concerning itself with the supply of what has ceased to be a luxury and has become almost a necessity in urban life, the requirements of excellence in these latter days being so stringent that nothing will be tolerated that falls short of scientific methods in manufacture or distribution, and of the best business practice in the commercial department of the work.

In the exhibition of public interest in our gas problem so marked a short time ago, it was with unqualified satisfaction that the Bureau of Gas noted the general recognition

of the abundance and good quality of the gas; for it is to this phase of the subject that our best efforts are continually directed. These are the objective points of all our labors and our numerous tests, taken under many varying conditions, prove that the estimate made by the citizens of Philadelphia was built upon a sure foundation.

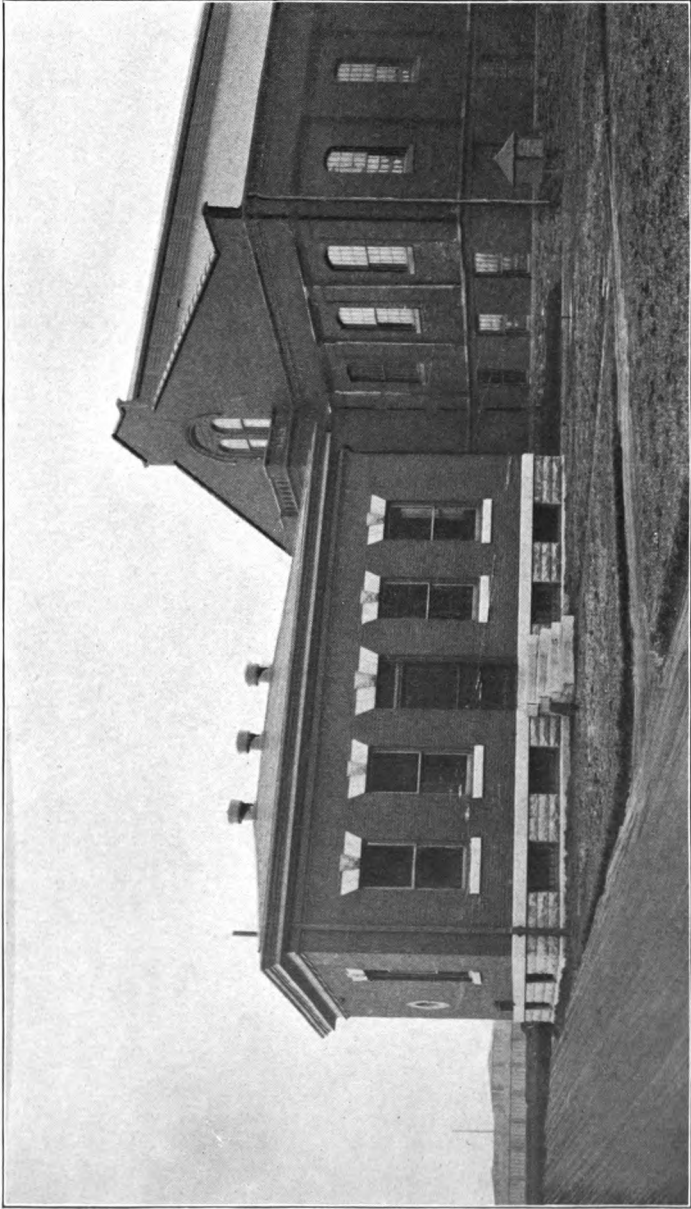
It is by no means a simple proposition to meet the demands of the City of Philadelphia for an adequate amount of gas of high illuminating power which shall be also sufficient for heating and motive uses, ever increasing in extent, and at the same time satisfy the requirements of a cultivated taste, seeking the convenience which the substitution of gas offers over other forms of fuel.

The technical features of the gas supply and the adjustment of disputes touching the accuracy of meters are matters of special concern to us and our view point demands the strictest attention to the details of manufacture and exact methods in dealing with the consumer.

Meter Inspection.

Extract from the Agreement between the City of Philadelphia and the United Gas Improvement Company.

Upon complaint of any consumer doubting the accuracy of the bill and declining to pay the same, lodged with such Inspector, alleging that the amount of gas for which the bill has been rendered and payment demanded is in excess of the amount consumed by such consumer, and upon demand thereafter made by the Inspector in writing to The United Gas Improvement company, or its assigns, said The United Gas Improvement Company, or its assigns, shall disconnect the meter in question and deliver it to the Inspection station for examination, where the testing of the meter for the purpose of ascertaining the correctness of its measurements shall be made by such inspector in the



WORKS PHOTOMETER STATION

Point Brezze Gas Works

presence of the representative of said The United Gas Improvement Company, or its assigns. Such tests shall be made according to the established and well-known methods used for such purposes. Any such meter shall be disconnected by said Company, or its assigns, between the hours of eight o'clock A. M. and three o'clock P. M., within 48 hours of the time when said company, or its assigns, shall receive notice to disconnect such meter for such reasons; and the same shall be tested and returned to said The United Gas Improvement Company or its assigns, within twenty-four (24) hours from its receipt at the testing station, bearing a seal upon which shall be written the report of the Inspector that the meter in question is correct or incorrect, and if the latter, the percentage which it runs fast or slow, and the bill of the consumer about which the complaint has been made shall be corrected according to such finding and report of the Inspector * *

* * * When a meter is removed for the purpose of testing, the said Company shall place a meter in place of one removed at their own cost and expense, the object being that no consumer shall be without light. The type of meter used for the measurement of gas shall be such type as shall be in general use in other large cities in the United States. Any consumer desiring such test shall, on making his application to such Inspector, pay to him the sum of one (1) dollar, taking his receipt therefor which amount shall be returned to the consumer if the tests and reports of the Inspector shall show that the meter in question is fast, but otherwise shall be paid by the Inspector into the Treasury of the City of Philadelphia. * * *

We notice a continued increase in the number of consumers who avail themselves of the protection offered by the Bureau in the settlement of disputes with The United Gas Improvement Company, touching the bill rendered,

but there is either a wide-spread lack of information or a general indifference that deters many from making application for the inspection which we are directed to make by the terms of the Gas Lease, (Clause II) and in line with which the following statement is submitted.

Meter Account.

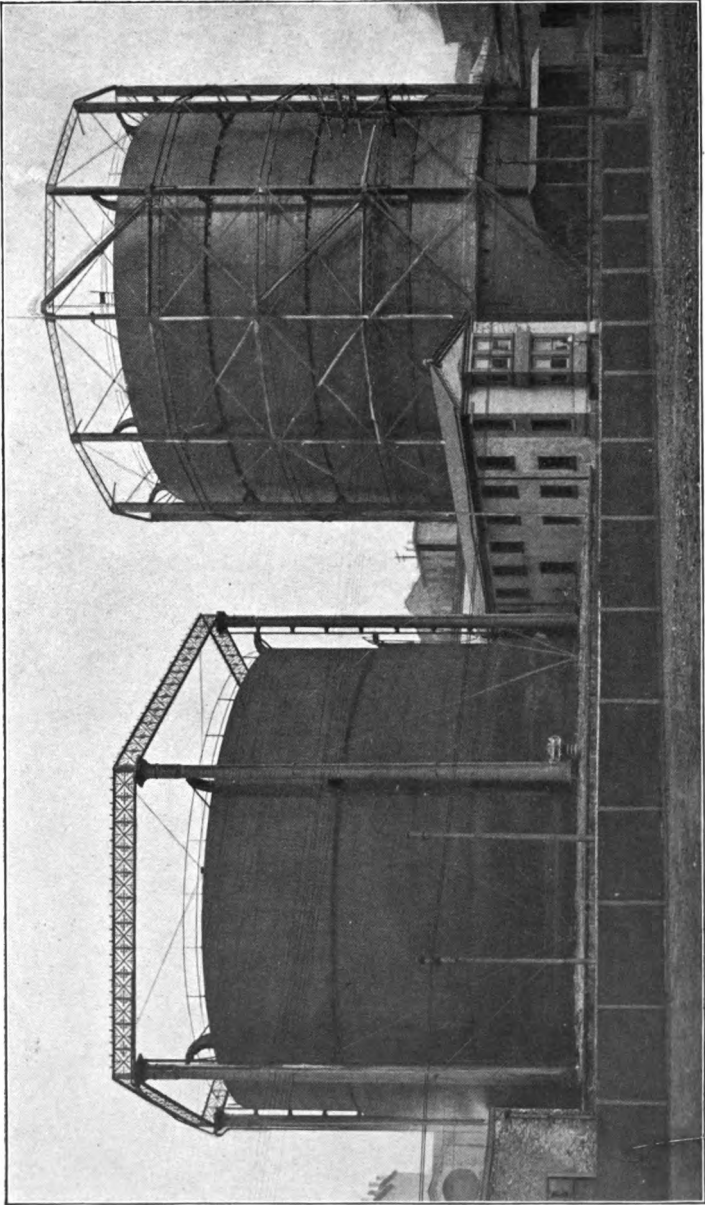
Total amount of deposits received from Consumers.....	\$139 00
Amount returned to Consumers	\$118
Amount deposited in City Treasury.....	21 \$139 00

We have examined one hundred and thirty-nine (139) meters which consumers presumed to be fast, twenty-one (21) of which were slow, one (1) was absolutely correct, one (1) failed to register and one hundred and seventeen (117) were fast. The average rate of error for the slow meters was 2.3% and for the fast meters 3.8%. In designating a meter as correct we mean that it is absolutely so; we are not allowed the latitude in vogue in many cities where certain limits of error are recognized and meters found to be within those limits are termed correct, although not so as a matter of fact. The terms of the lease make no definite provision for such an understanding, else some of the meters examined by us might pass as technically correct.

Illuminating Value of the Gas.

Extracts from the Agreement between the City of Philadelphia and The United Gas Improvement Company.

The United Gas Improvement Company, or its assigns, shall furnish proper stations for testing the candle power of the gas, located at a distance of not less than one (1) mile from each point of manufacture, and shall equip the same with a bar photometer and other appliances cus-



MANAYUNK GAS STATION
Showing New 1905 Holder, Capacity 906,000 cu. ft.

tomary and necessary for such purposes. Tests shall be made and recorded daily by The United Gas Improvement Company, or its assigns, and such records shall be at all times open to the inspection of the City. All such tests shall be made in the presence of a representative of the City, appointed by the Mayor, who shall have the right to also make such tests himself at such stations in the presence of the Company's representative. Such representative of the City shall be the Inspector of Meters, if City Councils provide by this contract or otherwise for the appointment of such an official.

The said The United Gas Improvement Company, its successors or assigns, shall, as soon after the delivery to them of said gas works hereunder as is possible with due diligence and dispatch, supply gas of good quality of not less than twenty-two (22) candle power, daily average, tested as above, and maintain said supply during the continuance of this lease, unless prevented by accidents beyond their control.

After the expiration of two years from the date of this lease for every failure of The United Gas Improvement Company, its successors or assigns, to comply with the terms of this clause, relative to tests, quality and candle power of gas, the said The United Gas Improvement Company, its successors and assigns, shall pay to the City of Philadelphia a penalty of five hundred (500) dollars for each day during which such failure continues. In every case of such default and demand made by the City for the payment of the fine The United Gas Improvement Company, its successors or assigns, shall be entitled to repayment of the same by the City, if it shall be shown that the default on account of which the fine was imposed was due to causes beyond the control of said The United Gas Improvement Company, its successors and assigns.

The methods in vogue for the maintenance of the standard required by the terms of the Gas Lease in regard to the candle power of the gas supplied are such that practical results have been secured, and a gas of uniformly high candle power has been furnished to our citizens. Our tests are from time to time modified so that no fixed arrangement shall exist other than the working out of the practical features of plans laid down by the lease.

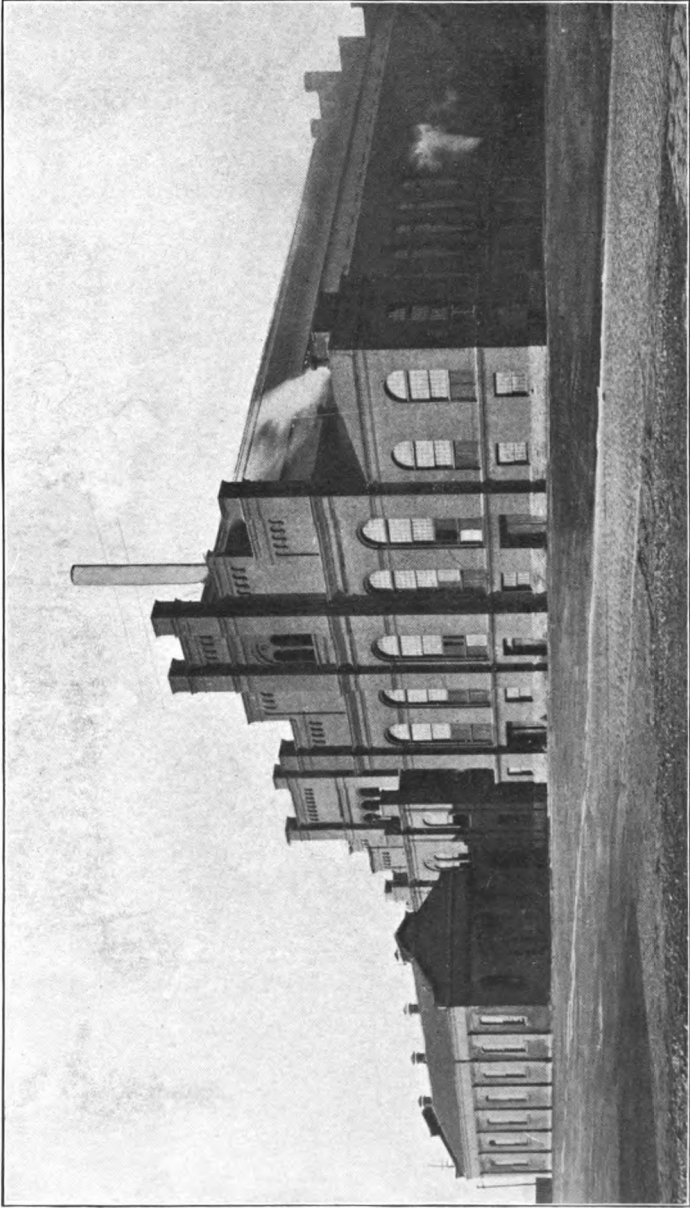
The following is the record of our inspection as carried on by observers duly sworn to discharge their duties faithfully at the gas testing stations, located respectively at Richmond and Ann streets and Seventeenth and Passyunk avenue.

January	22.98
February	22.97
March	22.94
April	23.03
May	23.38
June	23.19
July	23.01
August	23.11
September	23.84
October	23.32
November	23.11
December	23.20
Maximum monthly average	23.84
Minimum monthly average	22.94

In addition to the illuminating value of the gas, we have made numerous tests to determine its general quality.

Its average specific gravity was 0.633, the ammonia content 0.525 grains per one hundred (100) cubic feet, and the amount of sulphur 5.72 grams, while the search for tarry matter and hydrogen sulphide did not give positive results.

The chemical composition is further shown by the following:



POINT BREEZE GAS WORKS
View of part of manufacturing plant erected by The United Gas Improvement Co.

	Per cent.
Carbon dioxide	2.00
Illuminants	10.50
Oxygen	0.90
Hydrogen	35.50
Carbon monoxide	24.80
Methane	23.50
Nitrogen	2.80
	100.00

The total number of the various tests to determine the quality of the gas made during the year will somewhat exceed twenty-five hundred (2,500).

Gas for Fuel.

The use of gas for purposes other than illumination steadily advances. There are many persons now employing it for heating rooms and for cooking who a few years ago never contemplated its substitution for coal. The decreased labor supplemented by the convenience and cleanliness as well as the real economy when used intelligently, have all very materially increased the consumption, so that the heating power is an important consideration in the value of gas. The results obtained at our testing stations in the use of standard calorimeters indicate upon the average something more than 650 British thermal units, or in other words, a very satisfactory calorific value.

The use of gas engines has also made it necessary that attention shall be given to this feature of work—in fact, it may be said that in some directions the trend is towards a gas of high heating value and not of necessity such high illuminating value; for the incandescent mantles which are directly acted upon by a burning mixture of gas and air made non-luminous by the latter but developing great heat, rendering the mantle incandescent and intensely brilliant, are extensively used, but of course there are a

great many consumers who do not employ them who are alike entitled to protection against the annoyance of an illuminant of low candle power.

The United Gas Improvement Company has fully complied with the requirements of their agreement with the City of Philadelphia, touching the candle power of the gas and the prompt delivery of meters for inspection to our testing station upon our request.

We conclude our report with indebtedness for your kindly consideration and an expression of our grateful appreciation of the very faithful assistance of the officers of the Bureau of Gas.

Very respectfully yours,

N. WILEY THOMAS.

ANNUAL REPORT

OF THE

BUREAU OF CITY ICE BOATS

FOR THE

YEAR ENDING DECEMBER 31, 1905

OFFICERS
OF THE
BUREAU OF CITY ICE BOATS



Superintendent,
JAMES S. JEFFERSON.

Engineer,
C. CLENDANIELS.

ANNUAL REPORT
OF THE
BUREAU OF CITY ICE BOATS
FOR THE
YEAR ENDING DECEMBER 31, 1905

Philadelphia, January 2, 1906.

A. LINCOLN ACKER, Esq.,
Director, Department of Public Works.

DEAR SIR:—I have the honor to submit the following report of the operations of the City Ice Boats for the year ending December 31, 1905:

On January 1, 1905, all three boats were at their berths at House of Correction wharf, with a half crew aboard, steam up on boilers and ready to go into service at an hour's notice.

During this winter the City had the misfortune to lose City Ice Boat No. 3, on Sunday morning, 6 A. M., on February 5, 1905, which was sunk at the Delaware Breakwater, by drifting on the sunken wreck of the coal barge "Santiago." While the loss of this boat was most unfortunate, occurring at a time when the river was filled with ice, it was most providential that the crew was saved and there was no loss of life. This boat was 32 years old, her boilers and hull worn out, and it would have required the expenditure of over \$100,000 to have placed her in condition to go into service another season. At the time of the accident,

permission had been requested to prepare plans and specifications for rebuilding, at an estimated cost of \$110,000.

This boat originally cost \$250,000 and was built by Wood, Dialogue & Company, Camden, N. J., in 1872.

Within an hour's time of notification that the boat had been lost, arrangements had been made with the Philadelphia & Reading Railway Company for the charter of their ocean tug "International," which was the best substitute that could be procured; this boat was used for the balance of the season.

The Department at once made arrangements for the construction of a powerful new up-to-date ice breaker. The firm of Melville and Macalpine, Naval Architects, were commissioned to prepare plans and specifications for the same. On April 18, 1905, bids were opened and contract awarded to the William Cramp & Sons Ship and Engine Building Co. for the building of the new ice boat from plans submitted, to cost \$350,000 and to be completed December 15, 1905. The boat was launched December 28, 1905, and christened the "John Weaver."

At present writing it appears the boat will be completed by February 1, 1906.

The new ice boat embraces the very latest ideas in ice boat design and construction, being 232 feet long on deck, 45 feet beam, 22 feet depth of hold, 13 feet draft, three triple expansion engines of 1200 H. P. each and three propellor wheels—two aft and one forward.

The past winter, with its heavy ice in the river, demonstrates the advantage of having iron paddle wheels on the old boats, thus causing the loss of no time on account of repairing wheels. In the previous season they were constantly in the shipyard having their wooden wheels repaired.

The winter of 1904 and 1905 started in early, with considerable ice in the river. During the month of December,

1904, it had not become a sufficient obstruction to navigation to make it necessary to order the City ice boats into commission, but on January 6, 1905, the weather had grown so severe and so much ice had formed, that it was deemed advisable and necessary to place one of the boats at work.

On January 13, there ensued a period of mild weather, lasting until January 26, when cold weather again set in and continued until March, requiring the ice boats to remain in operation until March 11, when boats were ordered out of commission.

The winter was long and severe. On February 25, 1905, the ice was so heavy that it sank the tug "Southwark" in the Delaware river opposite Mantua creek and squeezed the tug "McCaulley" so badly that she sank upon reaching her dock.

The following is a detailed statement of the work of the boats during the past winter:

January 4 and 5. Sudden fall in temperature, making ice very fast.

January 6. Boat No. 3 ordered in commission; full crew placed aboard, boat brought to the City, coaled and provisioned and sent the same night to New Castle.

Boats Nos. 1 and 2 at House of Correction wharf.

January 7. Boats Nos. 1 and 2 at House of Correction wharf. Boat No. 3 working between Marcus Hook and Reedy Island.

January 8. Boats Nos. 1 and 2 at House of Correction wharf. Boat No. 3 working between City and Reedy Island. Convoyed the U. S. S. "Denver" from League Island to Reedy Island.

January 9. Boat No. 1 ordered into commission; arrived at Chestnut street 2.30 P. M. Took on balance of crew, coaled and provisioned and proceeded to Marcus Hook same night.

Boat No. 2 at House of Correction wharf.

Boat No. 3 working between Philadelphia and New Castle.

January 10. Boat No. 1 working between Reedy Island and Philadelphia. Boat No. 2 at House of Correction wharf. Boat No. 3 working between New Castle and Dan Baker Shoals.

January 11. Boat No. 1 working between Chester and Thompson's Point. Boat No. 2 at House of Correction wharf. Boat No. 3 working between Reedy Island and Marcus Hook.

January 12. Boat No. 1 working between Philadelphia and Chester. Boat No. 2 at House of Correction wharf. Boat No. 3 working between Wilmington and Reedy Island.

January 13. Boat No. 1 working between Chester and House of Correction wharf. Boat No. 2 at House of Correction wharf. Boat No. 3 working between Philadelphia and New Castle.

January 14, 15, 16 and 17. Boats Nos. 1 and 2 at House of Correction wharf. Boat No. 3 working between Philadelphia and New Castle.

January 18. Boat No. 1 working between House of Correction and Marcus Hook. Boat No. 2 at House of Correction wharf. Boat No. 3 working between Chester and Reedy Island.

January 19. Boat No. 1 working between Philadelphia and Marcus Hook. Boat No. 2 at House of Correction wharf. Boat No. 3 working between New Castle and Deep Water Point.

January 20. Boat No. 1 at House of Correction wharf. Boat No. 2 working between House of Correction and Chester. Boat No. 3 working between Philadelphia and New Castle.

January 21 to 26. Boats Nos. 1 and 2 at House of Correction wharf. Boat No. 3 working on her stations at New Castle.

January 27. All three boats working on their regular stations. Assisted the S. S. "Martnald" and tug "Atlantic," with barges.

January 28. All three boats on regular stations. Assisted tugs "New Castle," "McCaulley" and "Minerva," with tows.

January 29. All three boats working on regular stations. Assisted S. S. "George W. Clyde," "Benefactor," "Oriflame" and tugs "New Castle," "Juno" and "Sweepstakes."

January 30. All three boats working on regular stations. Assisted tugs "Imperator" and "Albert," with tows.

January 31. All three boats working on regular stations. Assisted tugs "Gettysburg," "Teaser," "Senate" and "Black Diamond," with tows.

February 1 and 2. All three boats working on regular stations. Assisted "McIlvaine" and "DuPont," with tows.

February 3. All three boats working on regular stations. Conditions on the river becoming very bad from ice. Assisted steamers "Goldsborough," "Yamessee," "Ones," "Treke," "Manchester Merchant," "Thistleroy," "Brandywine," "Spartan," "Eskcity," "Buenos Ayrian," "Charloes," "Athenia," "Guthill," "Meteor," "Meher," "Conestoga," "Valley Forge" and "Cuba."

February 4. Boats Nos. 1 and 2 working in Horseshoe and vicinity. Assisted steamers "Bluefield," "Clyde," "Cragon," "Paula," and tugs "Allegheny," "Swansea" and "Meteor." Boat No. 3 started from coal piers to Breakwater at noon.

February 5. Boats Nos. 1 and 2 working on stations. Assisted steamers "Bluefield," "Chester," "Riverside," "Athenia," "Cragon," "Northman;" tugs "Waltham," "Tamaqua," "Catawissa," "Meteor." Boat No. 3 sunk at Delaware Breakwater 6 A. M. All hands saved.

February 6. Boat No. 1 working between Philadelphia and Marcus Hook. Boat No. 2 working between Chester and Delaware City. Assisted tugs "Atlantic," "White Rose," "Imperator," with tows.

February 7. Boat No. 1 working in Shoe and vicinity. Boat No. 2 between Reedy Island and Horseshoe. International between Marcus Hook and Breakwater. Assisted steamers "Guthill," "Merion," "Ramsdale," "Ottawa," "Augusta," "Euxinia," "Minnesota," "Anna," "City of Philadelphia," "Norman," "Brandywine;" and tugs "Eureka," "Gettysburg" and "Swartara," with tows.

February 8. Boat No. 1 working in Horseshoe. Boat No. 2 between Horseshoe and Marcus Hook. International between Philadelphia and Breakwater. Assisted eleven steamships, ten tugs with 20 barges in tow.

February 9. Boats Nos. 1 and 2 working between Chester and Philadelphia all day. Assisted steamers "St. Oswald," "Ottawa," "Buenos Ayrian," "Peconic," "Pontof," and tugs "Kent," "Meteor," "Juno," "Meher" and "New Castle" with tows. International working between Philadelphia and Breakwater. Lay at Breakwater over night.

February 10. Boats Nos. 1 and 2 working between Philadelphia and Chester. Assisted steamers "Zanzibar," "Norman," "Spartan," "Nettleton," "Saugsted," "Anna," and tugs "Gettysburg," "New Castle," "Mars," "Lenape," "Imperator," "Lykens," "Juno," "Meher," with tows. International working between Breakwater and Marcus Hook. Lay at Hook over night.

February 11. Boats Nos. 1 and 2 working on regular stations all day. Assisted steamers "Schwarzburg," "Ligonier," "City of Philadelphia," "Pontog," "St. Gothard," "Parthian" and tugs "Meteor," "Swatara," "Boxer," "Teaser," "John Hughes," with tows. International, working between Marcus Hook and Breakwater. Lay at Breakwater over night.

February 12. Boats Nos. 1 and 2 working on regular stations all day. Assisted steamers "Vera" and "Thistleroy" and tugs "Meteor" and "Merion" with tows. International, working between Breakwater and New Castle. Lay there over night.

February 13. All three boats working on regular stations.

February 14. Boats Nos. 1 and 2 working on regular stations. Assisted nine steamships, sixteen tugs and twenty-four barges. International left Chester 6 A. M., arrived at Breakwater 5 P. M. Worked again at Reedy Island at midnight.

February 15. Boats Nos. 1 and 2 working of Lincoln Park most of the day. Assisted steamers "Allegheny," "Northman," "Mackinaw" and tugs "Meher," "Patience" and "Swatara," with tows. International working between Reedy Island and Marcus Hook.

February 16. Boats Nos. 1 and 2 working on station. Assisted steamer "Kingstonian" and tugs "Hagen" and "Kent" with tows. International working between Reedy Island and New Castle entire day.

February 17. Boats Nos. 1 and 2 working between Philadelphia and Chester all day. International between New Castle and Reedy Island. Assisted nine steamers, ten tugs with tows and barges.

February 18. Boats Nos. 1 and 2 working between Philadelphia and Chester entire day. Assisted steamers "Nora," "Sommerford," "Brandywine," "Whitehall," "Le-

ander," "Siberian," and tugs "McIlvaine," "Walls," "Cramp," "Meteor," "Atlantic," "White Rose," "Concord" and "Hughes," with tows. International working between Reedy Island and Philadelphia. Assisted four Philadelphia & Reading R. R. Co. tugs with tows.

February 19. Boat No. 1 working on regular station. Boat No. 2 between New Castle and Philadelphia. Assisted three steamers, one bark, and eighteen tugs with tows. International working between Philadelphia and Breakwater. Assisted five tugs, two barges, one schooner and one bark. Lay at Breakwater over night.

February 20. Boats Nos. 1 and 2 working in Horseshoe all day. Assisted five steamers, eight tugs with tows. International working between Breakwater and Edgemoor. Lay there over night.

February 21. Boats Nos. 1 and 2 working between Philadelphia and Chester all day. Assisted nineteen steamers and seven tugs with tows. International working between Reedy Island and Philadelphia. Lay there over night.

February 22. Boats Nos. 1 and 2 working between Philadelphia and Marcus Hook. Floated steamer "Santona," which was aground at mouth of Schuylkill river. International working between Reedy Island and Marcus Hook.

February 23. Boats Nos. 1 and 2 on regular station. International working between Philadelphia and Marcus Hook. Assisted two steamers and one tug, with tow.

February 24. Boats Nos. 1 and 2 working between Philadelphia and Marcus Hook. International between Philadelphia and Breakwater. Lay there over night.

February 25. Boat No. 1 on regular station. Boat No. 2 between Philadelphia and New Castle. Assisted one steamer and two tugs with tows. International left Break-

water for Philadelphia. Was put out of commission and turned over to her owners.

This was a very bad in the Horseshoe, the ice being very heavy. It sunk the tugs "Southwark" and McCaulley" towing the barge "Haverford."

February 26. Boat No. 1 working on regular station. Boat No. 2 between New Castle and Horseshoe. Assisted twelve steamers, five tugs with tows.

February 27. Boats Nos. 1 and 2 working in the Shoe all day. Assisted ten steamers, five tugs with tows and floated steamer "Buceros" aground in Shoe.

February 28 to March 9. Boats Nos. 1 and 2 working on regular stations.

March 10. Boat No. 1 proceeded to her berth at House of Correction wharf. Boat put out of commission and crew paid off. Boat No. 2 working at her station.

March 11. Boat No. 2 working between Chester and Burlington. Proceeded to her berth at House of Correction wharf and was put out of commission and crew paid off.

Caretakers proceeded to clean the boilers, engines and boats and prepared them for laying up over summer. Decks were shedded over to protect them from the sun.

During the summer, repairs were made to the wheels and machinery and the decks of both boats caulked by the John Baizley Iron Works. The caretakers carefully went over all the machinery, taking up lost motion, grinding in valves, putting in new piping and steam traps and overhauling electric plants.

RECOMMENDATIONS.

I again earnestly urge the placing of a telephone on the House of Correction wharf. There will now be nearly three-quarters of a million dollars worth of vessel property

laying at this wharf and the nearest fire-alarm box or telephone is a quarter of a mile away.

I also recommend that the dock at House of Correction wharf be dredged to a depth of fourteen feet at low water and that the bar formed at the entrance of the dock be removed.

All three boats will be required to be dry-docked and painted below the water line as soon as ice disappears. Boat No. 1 will need new combings, hand rails and waterways.

During the year the boats were in commission eighty-six days.

Annexed is a statement of expenditures of the Bureau of City Ice Boats for the year 1905.

All of which is respectfully submitted.

Yours truly,

JAMES S. JEFFERSON,
Superintendent.

Annual Statement of Expenditures of Bureau of City Ice Boats for 1905.

TRANSFERS TO AND FROM AS NOTED.					
	Item 1.	Item 2.	Item 3.	Item 4.	Item 5.
Annual appropriation...	\$12,980 00	\$8,400 00	\$300 00		
Emergency appropriation.....				\$5,000 00	
New ice boat appropriation.....					\$250,000
Transfers to.....	300 00	1,600 00	200 00		
Transfers from.....		1,300 00		1,800 00	
Available balances.....	18,280 00	8,800 00	500 00	8,200 00	
Amounts for which warrants were drawn....	12,918 75	3,174 23	478 87	8,106 85	182,600
Amounts merging.....	861 25	125 77	26 18	98 15	
Amount carried over to 1906.....					67,400

Annual appropriation.....	\$16,280 00	
Emergency appropriation.....	5,000 00	
New ice boat appropriation	250,000 00	\$271,280 00
<hr/>		
Amounts for which warrants were drawn.....	\$202,278 70	
Amounts transferred from	1,000 00	
Amounts carried over to 1906.....	67,400 00	
Amounts merging.....	606 30	\$271,280 00
<hr/>		
Amounts for which warrants were drawn.....	\$202,278 70	
Total amount paid to City Treasurer.....	1,485 00	
<hr/>		
Total operating expenses, including repairs and extensions.....		\$200,788 70
Amounts due and in City Solicitor's hands for collection	\$555 80	

ANNUAL REPORT

OF THE

OFFICIAL PHOTOGRAPHER

FOR THE YEAR 1905

DEPARTMENT OF PUBLIC WORKS

A. LINCOLN ACKER, Director

OFFICIAL PHOTOGRAPHER'S ROOM

730 City Hall

Philadelphia, February 6, 1906.

A. LINCOLN ACKER, ESQ.,
Director, Department of Public Works.

DEAR SIR:—I beg to submit herewith annual report of
work done by this Department, during the year 1905:

	Photo Negatives Made.	8x10 Photo Prints Made.	Photo Prints Mounted.	Lantern Slides Made.	Negatives Ind.	Cuts Filed.	Films Developed.	Prints of Films.	Blue Prints from Negatives	Blue Prints from Tracings.
Bureau of Surveys.....	303	951	394	20	396	115	.....	.....	.....	30,454 square feet.
Bureau of Filtration.....	571	1,187	571	113	.....	.....	.....	.....	1,872	34,452 "
Bureau of Water.....	9	21	.....	.....	.....	.....	.....	.....	.....	13,314 "
Highway Bureau.....	31	48	.....	.....	.....	.....	.....	.....	.....	.....
Board of Education Architects.....	2	19	.....	.....	.....	.....	.....	.....	.....	33,408 "
City Property and City Architects.....	20	33	33	.....	.....	.....	.....	.....	.....	900 "
Electrical Bureau.....	1	15	.....	.....	.....	.....	.....	.....	.....	450 "
Civil Service Board.....	8	22	1,781	.....	.....	.....	872	1,750	.....	21 "
Highway Supervisors.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 "
Total.....	1,080	2,296	2,746	133	396	115	872	1,750	1,872	122,000 square feet.

Law Department, 2 8 x 10 negatives, and 2 enlargements.

If done by contract.....	\$6,631 46
Salaries	\$3,600 00
Material	1,181 38
	<hr/>
Total cost to City.....	\$4,781 38
	<hr/>
Saved by City.....	\$1,850 08

Amount saved by the City for work done in 1903-04-05:

1903	\$679 20
1904	1,550 83
1905	1,850 08
	<hr/>
Total	\$4,080 11

Yours respectfully,

LEWIS R. SNOW,
Official Photographer.

