NINETY-EIGHTH ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE YEAR ENDING DECEMBER 31, 1900

AND

SECOND ANNUAL MESSAGE

OF

SAMUEL H. ASHBRIDGE

MAYOR OF THE CITY OF PHILADELPHIA

WITH

ANNUAL REPORT

OF

WILLIAM C. HADDOCK

Director of the Department of Public Works

ISSUED BY THE CITY OF PHILADELPHIA

1901

PHILADELPHIA
DUNLAP PRINTING CO., 1332-1336 CHERRY STREET

OFFICE OF THE MAYOR

PHILADELPHIA

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SAMUEL H. ASHBRIDGE

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GEORGE A. WELSH

Messenger
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Secretary Civil Service Board
GUSTAV BACHARACH

Stenographer
JOSEPH MARCUS

Clerk
WILLIAM WEAVER

SECOND
ANNUAL MESSAGE

OFFICE OF THE MAYOR, CITY HALL,

Philadelphia, April 1, 1901.

To 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 herewith submit to your Honorable Bodies my Second Annual Message, and transmit therewith reports from the following Departments immediately within my jurisdiction, to wit: Department of Public Safety, Department of Public Works and Department of Charities and Correction; accompanying these will also be found reports from the following Departments: Receiver of Taxes, City Treasurer, City Controller, Law, Education and Sinking Fund Commission.

In the Department of Charities and Correction there have been three changes caused by resignation. To these vacancies were appointed Dr. John V. Shoemaker, who has since been made President of the Board, Dr. E. S. Kirby and William J. McLaughlin.

DEPARTMENT OF PUBLIC SAFETY.

The various Bureaus in the Department of Public Safety have been maintained at a high standard of excellence under the direction of Abraham L. English. He has also

introduced a number of improvements towards the betterment of the public service. Details will be found in full in the report of this Department and of the Chiefs of the Bureaus thereunder.

Police.

The Bureau of Police merits general commendation for its uniformly good work. Never has it been under such discipline and in such good working order as at the present time. As a result of special attention to the drilling, both of the mounted men and footmen, the force is equal if not superior to that of any police force in this country.

Too much credit cannot be given to the officers and men for the admirable arrangements made and carried out for the protection of life and property and the conservation of public order in connection with the Twelfth National Convention of the Republican Party.

The increase of the number of Police Districts has given the Lieutenants and Sergeants a better supervision of the men, while the new regulation placing the responsibility for the continuance of the various forms of gambling and speak-easies on the men on beats as well as on their superior officers, has aided materially in breaking up these forms of law-breaking. The books of the Bureau show that during the past two years more arrests have been made for gambling and illicit liquor selling than during the previous seven years. This fact seems sufficient refutation of the unfair criticism to which the Bureau has been subjected.

The Detective Corps has rendered most efficient service during the year. The two most important cases were the prompt detection and arrest of the murderers of Prof. Roy Wilson White and Father Riegel.

Another important branch of the Police Bureau is that of Meat Inspection, and while the force is quite small,

comprising only three men assigned to this work, a considerable quantity of diseased meat was detected and condemned during the year. This is a vital division of police work, as it aids in preserving the health and welfare of the community. A number of consultations have been had with leading veterinarians who strongly urge a still more exhaustive inspection, which cannot be done, however, unless there is an increased number of men employed.

Fire.

The work of the Bureau of Fire has been maintained at the high standard to which the citizens of Philadelphia have become accustomed, notwithstanding the fact that larger appropriations should be made for improved apparata and for an increase in the number of the men. The several new companies which have recently been formed have enabled the Bureau to re-district the City and give additional safeguard to the public.

For a number of years the business men and Underwriters in this city have strongly been urging the construction and installation of a fire pipe-line in the central part of the city to afford greater protection to life and property, and it is interesting to note that as a result of prompt legislation by your Honorable Bodies last year, plans for the new auxiliary fire mains in the business section have been completed, bids received, and the contract awarded, and it is hoped that within a very short time this system will be in full operation.

In this connection permit me to call special attention to the efficiency of the four Fire Boats on the Delaware and Schuylkill Rivers. These boats for the present will supply the pipe line system from the Delaware River, but it would be advisable as soon as sufficient funds are available to establish a separate pumping station for this Auxiliary Service.

Under the direction of the Director of the Department during the past year, the regulations concerning fire escapes and the inspection of large department stores and buildings have been rigidly enforced. This will tend to prevent, in case of large conflagrations, serious loss of life and also affords greater protection to adjacent property.

Building Inspection.

In the report of the Chief of the Bureau of Building Inspection it will be noticed that the number of new structures erected has decreased slightly in respect to the number of dwellings constructed.

The Division of Elevator Inspection, which was installed under authority of an Ordinance of Councils, is giving great satisfaction and is certainly one of the most beneficial features of the work of this Bureau.

Boiler Inspection.

Under the official management of John M. Lukens, Chief of the Bureau of Boiler Inspection, the work of this Bureau has been systematized. In addition to its regular work, under an Act of Assembly, this Bureau must examine and issue licenses to engineers. During nine months of the past year the Bureau issued 2,043 certificates of this character, after a rigid examination as to the competency of candidates.

Electrical.

The Electrical Bureau has met the ever-increasing demands of this growing city with continued efficiency. The revenues increased more than $14,000 during the past year, while nearly 50,000 feet of conduit, 400,000 feet of ducts, 21 miles of underground cable and 500 miles of underground wire were laid more than during the preceding

year. These conduits can be leased to private concerns, and yield an increasingly handsome revenue to the city upon the cost of the construction.

During the year the Bureau supervised the placing of the electrical machinery for the moving of the pivot span of the Gray's Ferry Bridge, and has, at the request of the Trustees of the Girard Estate, in furtherance of the improvement on the Delaware River front, estimated the amount of conduits necessary to furnish them with means for carrying cable for lighting Front street, Delaware avenue and other thoroughfares. And under the direction of the Bureau lines of conduits were laid along the west and east sides of the widened Delaware avenue so that a more thorough lighting of that thoroughfare was effected by means of underground conductors.

Health.

The events of the past year have demonstrated that the change made in 1899 in the organization of the Bureau of Health was a beneficial one. Owing to an appropriation made by your Honorable Bodies great improvements have been made in the Municipal Hospital, enabling the officials to care for all contagious diseases. Additional money is needed, however, to still further increase the efficiency of this important branch of municipal work.

I would call the attention of your Honorable Bodies to the urgent necessity for an increase in the number of Inspectors of Milk. With the present small force it is impossible to do more than inspect the milk on the railroad platforms as it is brought into the city, and it can be readily seen that violations of this law after its inspection on the platform are not impossible.

I would call especial attention to the recommendation of the Director of the Department of Public Safety with

reference to the disinfection of the public schools. This is a most important matter, concerning as it does the health of the children, and should be given immediate attention.

City Property.

During the year just closed six public squares were improved at a total cost of approximately $50,000, opening up to the public, in various sections of the city, breathing places for our citizens. The preliminary work on the improvement of League Island Park is in progress and nearly 100,000 cubic yards of material have already been excavated. The pavilion at Chestnut Street Wharf on the Delaware River has proven such a boon in that congested district that it will be welcome news to many to state that the pavilion at Race Street Wharf will be completed this year.

It is most interesting to note the decrease in the amount paid by the City for rent and ground rents. In 1891 the sum paid by the City was $69,395. During 1901 the amount required will be $16,081.67. A substantial increase in the collection of rents from piers, docks and real estate gives proof of the efficiency of the management of the Bureau. The collections last year from real estate were more than double the receipts in 1899, while wharf rents increased nearly twenty per cent.

I call your attention to the recommendation of the Department that the Market sheds on Bainbridge street be removed, and that a bulkhead be constructed along the river front from South street to the Pennsylvania Railroad.

DEPARTMENT OF PUBLIC WORKS.

The Department of Public Works under the direction of William C. Haddock, has been busily engaged in preparing plans and specifications to carry into execution the

construction and installation of a new water system for the City. This system could not be hastily entered into nor without thorough care as to the general utility of the plans with relation to the future needs of the city. The work has so far advanced that during this year rapid progress will be made in carrying into the execution the much needed demands for the betterment and purification of the water supply. City Councils have acted with the greatest degree of promptness in aiding the Department.

Just one hundred years ago the work of this Department was practically begun in the construction of the Water Works on Centre Square, which supplied 200,000 gallons of water per day. This supply has now grown to 300,000,000 gallons daily, while the population has increased from 37,000 to nearly a million and a half.

Extensive improvements have been made in the Bureau of Highways and Surveys in the construction of a greater mileage of large and small sewers; also in the substitution for the old system of paving, of the most improved. These improvements have been made through the prompt action and liberal appropriations by your Honorable Bodies.

Water.

Never in its history, I am convinced, has the Bureau of Water reached such a high standard of excellence as under the efficient management of the past year. Through liberal appropriations made by City Councils, very many needed improvements have been made, including the installation of new pumps and the laying of new and larger mains, so that the danger of a water famine, which had haunted the Bureau annually in times of drought, has been made remote. This is notably the case at Queen Lane Pumping Station, where the Bureau is pumping more water with three engines than was ever previously done with four engines.

It can be stated now that there is ample steam and pumpage power to meet the fullest requirements for water, and hereafter when freshets bring mud and coal dust down the river, the pumps in every section, save that of West Philadelphia, can be shut down and the clean water stored in reservoirs drawn upon for several days' supply.

So far as West Philadelphia is concerned, the condition there will soon be remedied by the construction of an additional reservoir and the filter beds, contracts for which will be let before the close of April.

Another improvement which marked the past year has been the completion of a system which will supply Lawndale, Fox Chase and intermediate territory with water. This territory has heretofore been forced to depend upon pumps and springs for its water supply.

The Bureau during last summer and fall was busily engaged in laying large forty-eight inch mains to supply the Northeastern section of the City, which for several years past had been entirely without water during much of the day time, when the manufactories and mills were in active operation. These mains will temporarly supply water from Lardner's Point Pumping Station, and when the new Torresdale Filtration System is constructed, a full and ample supply of filtered water will be distributed in that section of the City.

The general re-inspection which has been instituted at my direction has disclosed the fact that the city has been losing annually almost $130,000 through connections made by plumbers without the knowledge of the Bureau, and $70,000 through negligence in former years in giving proper attention to manufactories and large establishments where meters were attached. But a little more than half of the wards of the city have been covered; even this, however, discloses the astonishing fact that in almost one-fifth of the total amount of properties inspected were found

appliances for which no water rent was paid. The additional water rent now paid for appliances found delinquent is $85,603.25. The inspection as made resulted in the discovery of considerable leakage which, of course, was at once attended to. By this and other means considerable waste has been checked, so that 3,000,000 gallons daily pumpage has been saved, giving as an immediate result, increased subsidence and greater pressure. In consequence of this there has been a marked decrease in the number of complaints as to the quantity and quality of the water.

The entire re-inspection of the city will be completed by inspectors and clerks employed upon the per diem roll at $1.75 per day. The entire cost of this re-inspection will amount to about $21,000, showing a net gain of about $70,000 to the city for the first year, and with the gross amount of at least $140,000 each year thereafter.

For seventeen years the ordinance requiring permits had not been enforced. The city in that period has lost approximately $2,000,000 revenue which should properly have been paid in by owners of properties. These two items amount in the aggregate to $200,000, materially increasing the revenues of this Bureau, which already shows $819,137 net profit yearly.

I would call the attention of your Honorable Bodies again to the beneficial results which will follow the general introduction of water meters. While it is a trite saying that water is as free as air, there is no saying which is more deceptive. While the air is free, it costs considerable money for ventilation, and while the water in the same sense is free, it costs considerable to pump and to bring it to one's door. Therefore any method by which the charges could be made equitable, waste restricted, the operating expenses of the works reduced, and a reduction effected in the amounts required for operation, should be cheerfully welcomed by the taxpayer, upon whom falls the burden

of the cost. The introduction of water meters, when requested by owners and tenants, would go far to accomplish these beneficial results.

Notwithstanding the universal expressions of the public and my pronounced stand in opposition to the sale or lease-ment of the Water Works of this City, the efforts of those who have been endeavoring to obtain this valuable franchise have not ceased. Notwithstanding the plots and schemes to finally accomplish this purpose, it is the intent and determination of the Administration to push to a speedy completion the construction and installation of the new water system as primarily suggested by the water experts and Citizens' Committees. Taxpayers and citizens may feel assured that never, with my consent or approval, will the water system, so near to the health and well-being of the community, be placed beyond the control of the municipality.

Surveys.

The highest commendation should be awarded to the Chief Engineer of the Bureau of Surveys and his Assistants for their studious and constant attention to duty, by which alone could be successfully carried on the very many important improvements entrusted to their care. The preparation for placing such a large amount of work under contract, and the necessary supervision during construction, involve a very great amount of detail work, and it is only through systematic methods and with a complete organization that work of such magnitude and variety could be carried on successfully. The Pennsylvania Avenue Subway and Tunnel; the widening of Delaware avenue between Vine and South streets, and the proposed continuance of this great improvement north of Green street, which is now being negotiated; the deepening of the Delaware and Schuylkill River channels; the large

pavilion pier at Chestnut street wharf on the Delaware River, and the pavilion pier which is now under construction at Race street wharf, wherein will be quarters for the fire and police service; Gray's Ferry Bridge, the only swinging-span, paved bridge, electrically operated, which has recently been turned over to the public, are only a few of the many important works which have come within the jurisdiction of this Bureau during the past year.

I would again renew the suggestion made in my First Annual Message concerning the plotting of new streets in the undeveloped portion of our city at certain intervals. Main streets should be made wide and beautiful by means of trees and grass plots. This scheme of urban adornment has been introduced with fine effect in other large cities and would certainly make our own suburbs more attractive. By placing the streets upon the City Plan now, builders and property owners could adapt themselves to these new conditions, and damages would therefore be avoided.

For upwards of one year I have been in consultation with the officials of the Pennsylvania Railroad Company, Philadelphia and Reading Railway Company, Belt Line Railroad Company, and the Board of City Trusts as Trustees of the Girard Estate, in reference to the widening of sidewalks and the repaving of Delaware avenue, between South and Vine streets. In consequence of the non-agreement of the various interests, this work has remained uncompleted. By frequent efforts, however, an agreement has now been entered into; the injunctions will soon be dissolved and the necessary improvements will be made as primarily directed by Ordinance of your Honorable Bodies. These improvements will greatly add to the appearance of Delaware avenue and likewise facilitate the handling of the shipping at our piers.

Highways.

The Bureau of Highways maintained the remarkable standard established by it in 1899. Philadelphia can still claim the reputation of the best paved city in the world. Its macadamized roads are unexcelled by any city in the Union and rival the famed roads of France. The records of the Bureau show that more miles of the old cobble and rubble paved streets were repaved with improved pavements during 1899 and 1900 than during the whole six years preceding, and at a much less coast. From 1893 to 1898, inclusive, there were 82.3 miles of streets repaved at a cost of $2,841,827.75. During 1899 and 1900 there were 87.7 miles repaved at a total cost of $2,688,076.83, showing that five and two-fifths miles more were repaved during the latter period at a cost of $153,750.92 less than during the preceding six years.

Reference to the Bureau of Highways would be incomplete were not the advantages of the new system of repairing streets noted. Prior to 1899 it had been the custom to make repairs at a fixed price per square yard. When the appropriation was exhausted the work would stop. Under the new system of awarding the contract for repairs to all streets for a lump sum, every street is repaired and kept in repair and not a single complaint has been received from citizens or drivers, either written or verbal, that improper and imperfect repairs had been made. It is interesting to note also, as indicating the improved condition of the highways and as illustrating the increased ease with which they can be repaired, that the lump bid for this work in 1899 was $510,000; in 1900, $334,950; and for 1901, $172,900, showing a marvellous decrease in cost, and yet a better condition of the highways.

In the maintenance of unpaved and macadamized public highways more broken stone was spread and rolled during

1899 and 1900 than during the whole period covered by 1895-96-97-98, at an actual saving of $26,900 in the cost of maintenance.

City Ice Boats.

Under the management of James S. Jefferson, the new Chief of the Bureau of City Ice Boats, the efficiency of the boats has been greatly improved. Thorough repairs were made during the past summer, especially in the steam steering gear, so that during the months of hard service these boats have not been compelled to lay off for repairs a single day. The employees being emergency men, discipline has been preserved by prompt discharge for any breach thereof. Permanent improvements of the boats have been impossible on account of the small appropriation made by Councils.

Gas.

The technical nature of the duties of the Bureau of Gas render them somewhat inconspicuous, but none the less important. The work of this Bureau is valuable in that it contributes to the improved condition of the City gas supply in respect to its quality and illuminating value, as well as the arrangements made for furnishing the consumers with every possible redress touching any inaccuracy of meters. During the past year 2,340 tests were made as to the quality of gas and only three complaints were made and investigated as to the condition of meters.

Lighting.

The addition of one clerk and two inspectors to the force of the Bureau of Lighting has enabled it to give much closer supervision to this important branch of municipal work.

Street Cleaning.

The Bureau of Street Cleaning has been maintained on a high plane of excellence, among the improvements introduced being the collection and removal of dry street dirt in bags, removing the wet dirt in metal carts, the separate removal of waste paper and rubbish where separately placed by householders, the more frequent cleaning of the streets and the uniforming of the street cleaners.

DEPARTMENT OF CHARITIES AND CORRECTION.

A reorganization has been effected in the Department of Charities and Correction under the direction of Dr. John V. Shoemaker and his associates on the Board, which has notably increased the efficiency of the two divisions of this important branch of the municipal government. Under the old system the Board was divided into two Committees, one on Charities and one on Correction, each of which visited the institution assigned them at infrequent intervals. Under the new organization, each Division of the Department has been made a Bureau with a Superintendent or Chief, who is held responsible for all matters connected with the Institution under his care. William M. Geary has been appointed Superintendent of the Bureau of Charities. The Superintendency of the Bureau of Correction has not yet been filled. The reorganization also abolished the office on Seventh street, combining all of the general features of the two divisions in a Department Headquarters on the third floor in the City Hall. It has also led to the abandonment of the old system of paying support money to deserted wives under which for hours women

and children were compelled to stand in line waiting their turn. Under the new system checks are mailed them at stated intervals.

The reorganization, however, contemplates more radical changes still. Already the Philadelphia Hospital has been placed on a high grade of efficiency, both as a hospital and in point of value as a teaching school for all of the Medical Colleges located in the City of Philadelphia. This has been brought about by the appointment to the visiting staff of surgeons and physicians—men of eminence in their profession, chosen as representatives of the medical institutions. The importance of this matter to the City of Philadelphia as a chief medical teaching center in this country cannot be overestimated, and is bound to attract hither thousands of students who are ambitious to enjoy the very best advantages in pursuing their studies and in attaining a wide and varied experience preparatory to embarking in the active practice of their profession. The reorganization is more far-reaching, however, in that it contemplates the entire separation of the Philadelphia Hospital and the Philadelphia Almshouse, and the extension and improvement of the Hospital so that it will be the most important as well as the largest general hospital in the world. The removal of the insane and the almshouse to new localities yet to be selected will make room for a Main Hospital Pavilion, additional wards and clinic halls. A great amphitheatre, seating three thousand men, will be a feature of the new buildings.

House of Correction.

The House of Correction has never been properly organized as a reformatory. The methods in that institution have frequently been lax and extravagant. It is the intention to greatly change the former methods and condi-

tions, making it what it was originally intended to be, a place of reformation for men and women who are committed for minor violations of the law. It is believed that the condition of inmates can be vastly improved and the institution conducted with better results in purifying and protecting the morals of the community.

DEPARTMENT OF EDUCATION.

The most important incident in the public school system under the management of the Department of Public Education, during the past year, is the practical completion of the new Boys' High School and Annex. While it is to be regretted that the construction of this building has taken so long, the city is to be congratulated upon its magnificence and its appointments.

It seems to me that it would be wise to establish in the northern and southern sections of our city new and additional Manual Training Schools. Such institutions give to the boys greater opportunities in mechanical education, better preparing them for a high and useful career in their callings, as well as promoting the development of the manufacturing interests of our city.

I would therefore recommend to your Honorable Bodies the earliest consideration and most liberal appropriations for carrying into effect this suggestion.

DEPARTMENT OF LAW.

The work of the Department of Law has been especially valuable to the Executive Departments of the City Government. It has promptly responded to all requests for advice, which has in every case been most luminous.

CITY CONTROLLER.

The report of the City Controller gives evidence that the City's finances are in a most satisfactory condition. The credit of the City is high and its securities are in active demand for investment by Trustees and Estates.

Notwithstanding the loans voted for by the people during the last three years, amounting in the aggregate to $23,000,000, the report of the Controller shows such excellent condition that the City, by a vote of the people, could yet borrow about $14,000,000. Captain John M. Walton, Controller, furnishes the following statement of the available borrowing capacity of the City on January 1, 1901:

Estimated assessed valuation of real estate for taxation in 1901 as reported by the Board of Revision of Taxes.....		$894,628,974 00
Percentage authorized		7
		$62,624,028 18
Total funded debt January 1, 1901.....	$54,919,595 22	
Securities in Sinking Fund	12,368,050 00	
Revenue and Solvent debts applicable to payment of said debt..	4,755,128 01	
	$17,023,178 01	
		$37,896,417 21
		$24,727,610 97
Less authorized loans awaiting negotiation		11,800,000 00
Further available borrowing capacity...		$12,927,610 97

Among the assets of the City not included in the above available are 45,000 shares Philadelphia & Erie R. R. Co. stock at $30	$1,350,000 00

It was my judgment two years ago that the enormous increase in mandamus payments should be greatly curtailed. This was found not to be possible except in a gradual manner, many streets and improvements having been for several years previous directed to be opened, grading and other work to be done without appropriations being made. Methods, however, have been steadily applied with a view to a gradual decrease of previous large payments by mandamuses, and it is most gratifying to learn from the Controller that the results of this judicious course are now becoming manifest.

SINKING FUND COMMISSION.

The financial interests of the City have been guarded carefully by the Sinking Fund Commissioners, who have performed their onerous and exacting duties most capably.

PUBLIC LIBRARY.

Nothing renders a city more attractive to visiting strangers than the existence of imposing buildings devoted to educational purposes, the preservation of pictures and the housing of books which are now to be found in the center of so many of the larger cities of the United States. One of the first questions addressed to a visitor to Boston, Chicago or Pittsburg is, "Have you seen our Public Library?" In Philadelphia we have many buildings of historic interest, it is true, but they are scat-

tered over a wide area, and the memory of our magnificent pile of municipal offices is pretty nearly all that a visiting stranger carries away with him. In view of this, it would seem that fine buildings in which to house our valuable collections of pictures and books, would, if centrally located, prove of substantial public benefit.

The Free Library of Philadelphia has proved itself an institution of which the city may be proud. It has the largest circulation of books of any Free Library in the World. It has exercised for the past eight years a wide-spread influence for good throughout the city, and it now consists of a central library and sixteen branches. Its greatest need, at present, is a main central building, and it is to be hoped that this will be undertaken in the serious and liberal spirit that such an undertaking calls for, if the Free Library is to be the pride of our city. The Library has a collection of very valuable books, and if fire should overtake the building before its collection is removed the event would prove an almost irreparable disaster. The sum of $1,000,000 has been provided for a new location and building, and just as soon as the trustees select the site, I am sure your Honorable Bodies will enact the necessary legislation.

In June of the year just closed the Twelfth National Convention of the Republican Party was held in this city, the gathering of such a large body being possible through the wisdom of the course of your Honorable Bodies in providing for the erection of a large assembly room at Exposition Hall during the preceding year. Men of National prominence gathered here from every State in the Union and tens of thousands of visitors thronged our streets, hotels and places of amusement, and a monster street demonstration occurred upon one of the evenings during the Convention. The proceedings throughout were unmarred by a single untoward accident.

During the year only one appeal was made to the charity of Philadelphia, and this was for the storm-swept towns of Texas. Needless to say, the city made a liberal response, as it has always done in the past, equalling that of any city of the Union.

Mention should also be made in this message of the imposing demonstration made at a small cost under the direction of a Committee of your Honorable Bodies to celebrate the Dawn of the Twentieth Century. I will venture to say that no more impressive celebration was made anywhere in the world. Thousands of people came hither from surrounding cities to view the magnificent spectacle.

It is to be regretted that the efforts of our Congressmen and Senators failed in securing an additional appropriation for the deepening of the Delaware and Schuylkill River channels. The importance of further deepening the rivers is too well known to need argument here, but I would urge upon your Honorable Bodies the necessity for continued work along this line so that the next Congress may pass a supplemental appropriation for this purpose to the money heretofore appropriated and which has not yet entirely been exhausted. This is very essential to the progress and prosperity of the maritime and commercial interests of our city.

I would respectfully call attention to the opening and dedication of the new United States Mint on Spring Garden street, between Sixteenth and Seventeenth streets, which will be formally transferred to the Treasury authorities within a few weeks. I am in correspondence with the Secretary of the Treasury concerning a National and Civic demonstration in commemoration of the opening of the largest modern Mint in the world. It is but fitting that our city wherein it is located should mark the event by making a celebration.

The South Carolina and West Indian Exposition, which will be held in Charleston beginning September 1st, next,

will be brought to your attention by a special message recommending an appropriation for a display of the manufacturing and commercial interests of our city. This, in my judgment, will be of material benefit to the manufacturing and commercial organizations of this city in furthering an interchange of trade with the Southern seaboard cities.

Upon the retirement of J. Hampton Moore to become City Treasurer, Arthur R. H. Morrow was appointed by me as Secretary, which appointment you immediately confirmed. As his successor I have appointed Gustav Bacharach as Acting Secretary of the Civil Service Examining Boards, his appointment dating from January 1, 1901.

The report of the Secretary of these Boards shows that during the last year there were 269 examinations at which appeared 3,383 candidates.

In conclusion, I beg leave to express the hope that the harmonious relations which have existed between the Executive and Legislative Branches of our Municipal Government shall continue, for it is only through the sincere co-operation of these two that the multifarious interests of the city can be best promoted and protected.

Very respectfully,

SAMUEL H. ASHBRIDGE,

Mayor of Philadelphia.

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

FOR THE

YEAR ENDING DECEMBER 31, 1900

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OFFICERS

OF THE

DEPARTMENT OF PUBLIC WORKS

Director:
WILLIAM C. HADDOCK.

Assistant Director:
HARRY W. QUICK.

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.
MESSENGER—JOHN P. JUNIOR.

Superintendent of City Ice Boats:
JAMES S. JEFFERSON.

Chiefs of Bureaus:
GAS—DR. N. WILEY THOMAS.
HIGHWAYS—WILLIAM H. BROOKS.
LIGHTING—JOHN J. KIRK.
STREET CLEANING—SYLVESTER H. MARTIN.
SURVEYS—GEORGE S. WEBSTER.
WATER—FRANK L. HAND.

FOURTEENTH ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

WILLIAM C. HADDOCK, Director

Philadelphia, January 2, 1901.

HON. SAMUEL H. ASHBRIDGE,
Mayor of Philadelphia.

DEAR SIR:—In accordance with the Act of Assembly, approved June 21, 1885, I have the honor to present the report of the Department of Public Works for the year ending December 31, 1900—the fourteenth annual report of the Department.

The work under the direction of the Department during the past year progresed in a satisfactory manner and without any very serious complications; most efficient service has been rendered by all the officers and employees. The improvements in the highways, and sewer and water systems, are more manifest by reason of the enlarged operations of the respective Bureaus having charge of the several interests.

The most conspicuous feature of the year's operations was the long drought which threatened not only our City, but many other cities and sections of the country with a water famine, and which will be remembered for many years to come, particularly by the officials of municipalities

upon whom devolved the responsibility of maintaining the water supply.

In the spring we contemplated, with satisfaction, our overflowing reservoirs and the abundant sources of supply which fed them. We thought, no matter how much water our citizens consumed and wasted, nature had provided and would continue to provide sufficient water for all purposes. Before the summer had far advanced, the fast receding lines on our reservoir embankments and the steady decrease of our rivers and the meadow brooks and mountain springs which fed them, warned us of a short supply, and not until late in the fall was our anxiety and dread of a water famine dispelled.

Notwithstanding the disadvantages under which the Department labored and the difficulties we had to contend with, there was not a time during the continuance of the drought that we were required to restrict our citizens in the lawful use of water.

The reports of the Chiefs of the Bureaus of this Department set forth in detail the amount of work accomplished and the large number of permanent improvements made during the past year, all of which were essential to the comfort and welfare of our citizens.

Bureau of Surveys.

The work devolving upon this Bureau is of the most important character and the proper execution of it has much to do with the present and future welfare of the City.

The construction of main and branch sewers being underground, is not seen and hence it is unappreciated; but there is no municipal work that tends so much to improve the health and sanitary conditions of the community as the extension of its sewerage system.

The report of the Chief Engineer of this Bureau is a document which reflects great credit upon him for the very

careful, very able and very exhaustive features which characterize it and it is worthy of careful perusal.

The expenditures of the Bureau of Surveys during the past wear were $2,136,757.10. Of this amount $1,891,-634.32 were expended for permanent improvements and the balance for the current expenses of the Bureau. The receipts for the year amounted to $178,017.11, an increase of $29,203.88 over the previous year.

On account of a large part of the appropriations for main sewers having been made in the annual appropriation, and the apportionment of the funds made early in the year, the Bureau was enabled to begin work promptly in the spring and finish most of it in favorable season.

Twenty-six thousand, six hundred and twenty-seven (26,627) linear feet of main sewers and 206,562 linear feet of branch sewers, covering a distance of 44.16 miles, were built during the past year.

Work was continued upon all the main sewers in process of construction at the time of the report for 1899 and all were completed but two: the east branch of the Wingohocking sewer and the Aramingo avenue sewer. Work upon these two sewers is progressing.

Twenty-one (21) main sewers were placed under contract during the year and work upon them was promptly commenced and vigorously prosecuted. The following have been completed to the extent of the appropriation made:

Godfrey avenue, across Broad street.

Olney street, on line of proposed Boulevard near Seventeenth street.

Pratt street, between Frankford avenue and Willow street.

Sixtieth street, from Catharine to South streets.

Wingohocking creek sewer on Courtland street, from terminus near Ninth street eastwardly.

Work upon the following is progressing and it is expected that all will be completed during the year 1901:

Courtland street sewer extension, from terminus near Ninth street eastwardly.

Lincoln avenue sewer extension, from Sedgwick street to Cresheim avenue and on Cresheim avenue to Mount Pleasant avenue.

Mantua creek sewer reconstruction on Thirty-seventh street, from Mantua avenue to Brown street and on Brown street, from Thirty-seventh to Thirty-eighth streets.

Sixty-second street sewer extension on Sixty-second street, from north of Arch street to Market street and on Market street, from Sixty-second street to terminus of present contract.

Thomas run sewer extension on Fifty-fifth street, from south of Baltimore avenue to a point near Thomas avenue.

Charles creek drainage system on Sixty-fifth street, from Buist avenue to Woodland avenue.

Chestnut street, from Fifty-sixth to Fifty-ninth streets and on Fifty-ninth street, from Chestnut to Arch streets.

Cohocksink sewer reconstruction on Norris street, from a point east of Eleventh street to Eleventh street and on Eleventh street, from Norris to Diamond streets.

Cohocksink relief sewer on Shackamaxon street, from the Delaware river to Thompson street, and on Thompson street to Mascher street.

Intercepting sewer connections in Ridge avenue, from Richmond branch of Philadelphia and Reading Railway to Scott's lane and on Scott's lane, from Ridge avenue to Indian Queen lane.

Montgomery street relief on Sydenham street and Columbia avenue, from end of present contract to Twentieth street.

Magee street, from Milnor street to the Delaware river.

McKean street relief in Swanson street, from Snyder

avenue to McKean street and on McKean street westwardly.

Oxford street relief sewer, from Thirtieth to Twenty-sixth streets.

Robinson street sewer extension on Race street, Sixty-second street and Market street, from terminus south of Vine street to Sixty-third and Market streets.

West branch of Wingohocking creek sewer on Bellfield and Sprague streets, from Sharpnack street to Mount Pleasant avenue.

To continue the extension of the main sewer system, Councils have appropriated for the year 1901, $300,000. This amount is entirely inadequate to meet the many pressing demands made upon the Department for the construction of main sewers, many of which are needed in the suburban districts where there are large tracts of land that will be rapidly developed as soon as proper drainage facilities are provided.

Attention has frequently been called to the necessity and importance of providing a proper drainage system for the district of Frankford. This matter becomes more urgent each year, because of the increased pollution of Little Tacony creek, due to the number of new sewers which empty their drainage into it. Plans for a comprehensive drainage system for this entire section of the City have been prepared and Councils should make provision to begin the construction of this important system of sewers. If it is deemed inadvisable to appropriate a large amount in any one year, the work can be accomplished by appropriating moderate sums each year for a number of years.

The building of connections with the intercepting sewer was continued to the full extent of the limited amount appropriated. The money available for this purpose during the year was applied to the construction of a connection with the intercepting sewer in Ridge avenue, from the

Richmond branch of the Philadelphia and Reading Railway to Scott's lane and on Scott's lane, from Ridge avenue to Indian Queen lane. This sewer, when completed, will intercept a large amount of surface drainage at the Falls of Schuylkill in the vicinity of Dobsons' mills.

Branches three miles in length, tributary to the main intercepting sewer, were constructed and paid for from the branch sewer item as follows:

Cotton street, from Boone to Terrace streets.

Chestnut Hill and Spring House turnpike, from Germantown avenue to Summit street, and on Summit street northeastwardly.

Jefferson street, from Hortter to Weaver streets, and on Weaver street, from Jefferson street to Germantown avenue.

Keyser street, from Price street southeastwardly.

St. David street, from Dupont street to Green lane.

Sherman street, from Duval to Johnson streets, and on Johnson street, from Sherman to Green lane.

The following sewers are in course of construction and will be completed in the early part of the present year:

Hermitage street, from Smick to Silverwood streets.

Midvale street, from Wissahickon avenue to Coulter street.

Sharpnack street, from Jefferson to Germantown avenue and on Berdan street, from Sharpnack to Sharpnack streets.

Rector street, from Terrace street northeast to Pechin street.

The continued increase in the number of connections to the main intercepting sewer has so increased the flow in this sewer that it is necessary to divert the Germantown and Chestnut Hill drainage from the Schuylkill river to the Delaware river. This will involve the construction of a sewer from Twenty-fourth street and Indiana avenue to the Wissahickon High Level sewer at Rittenhouse street.

It is incumbent upon Councils to make provision for this work.

Work upon the Wingohocking creek system has been continued during the year at three different points and to the extent of the funds available for the purpose. In order to meet the advance in improvements, this system will require from year to year additional extensions along the line of its various branches.

The old Cohocksink sewer on Norris street and Eleventh street was found to be in an extremely dangerous condition and two contracts were entered into for its reconstruction. The first embraced that portion of the sewer on Norris street, from the chamber at Ninth street to a point east of Eleventh street. The work of reconstruction on this section has been completed. The second contract covered that portion from a point east of Eleventh street to Eleventh street, and on Eleventh street, from Norris to Diamond streets. Work under this contract is progressing and will be completed in the early part of the present year.

During the past year 35.27 miles of branch sewers were constructed by the City, and under private contract 3.85 miles. Seven hundred and seventy-three (773) inlets not included in sewer contracts were built or rebuilt, and 7,623.69 feet of curved or straight granite curbing placed in connection therewith.

Twenty-six thousand eight hundred and twenty-three (26,823) feet of lateral sewer connections were laid in streets to be paved or repaved, the bulk of this work being done preparatory to the paving or repaving of streets. Three hundred and thirty-nine (339) drain connections were made with the intercepting sewer and its branches and 6,839 connections with other sewers were authorized during the year. In addition to this, about 1,650 buildings were connected to sewers built at private cost.

There was available for the construction of bridges dur-

ing the year $750,000, but the ordinance authorizing the work and designating the bridges to be built was not passed by Councils until December 12, 1900—too late in the season to commence active operations.

The work authorized includes fourteen spans, with the masonry and other work appurtenant thereto, not including the three bridges required in abolishing the grade crossings on the line of the Chestnut Hill branch of the Philadelphia and Reading Railway, between High street and Washington lane.

Plans for the larger part of the work authorized are completed and specifications are now being prepared preparatory to an early advertisement for proposals. Work upon all bridges authorized will be commenced in the early part of the present year.

The contract for the pavements, railings and other appurtenances, including painting, for the completion of the Grays Ferry bridge was awarded to the Alcatraz Paving Company, in accordance with proposals received May 8, 1900. Ninety per cent. of the work under this contract has been completed. As soon as the unfinished work under a prior contract with the Phoenix Bridge Company for the metal superstructure is finished, so that travel can be diverted to the new bridge, the remainder of the work will be hastened to completion.

Plans and specifications were prepared by the Bureau of Surveys for the building of two viaducts on the line of Rhawn street, over Pennypack creek; these structures are 529 and 942 feet long respectively. The appropriation for this work was made to the Bureau of Highways, but the designs, locations and supervision of construction have been done by the Bureau of Surveys. At this date the bridges are completed, except the erection of a part of the railings and the placing of a few minor appurtenances, such as lamps-posts, etc.

The only other bridge upon which work was actively commenced during the year was the one on the line of Coulter street, over the Philadelphia, Germantown and Chestnut Hill Railroad. The ordinance authorizing this work provides that the Union Traction Company and the Pennsylvania Railroad Company shall file an agreement to pay all costs and expenses in excess of the sum of $10,000 for the construction of the bridge and the revision of grades, provided that if the entire cost shall be less than $20,000 the City shall pay one-half only.

Work upon this bridge is progressing, and at this date—January 2, 1901—the abutments are well advanced towards completion.

The Bureau is engaged in the revision of lines and grades in many of the rural sections of the City, where large numbers of building and land operations call for City improvements. There is before Councils at the present time several new projects involving a wide range of improvements, the most important of which is the abolishment of grade crossings on the line of Ninth street, and at Kensington avenue and Frankford avenue, on the Richmond branch of the Philadelphia and Reading Railway.

The contemplated improvements are all being studied, planned and estimated upon constantly, and reports prepared and forwarded to the committees of Councils having the matters in charge.

Pennsylvania Avenue Subway and Tunnel.—The work upon this important improvement, which was commenced in the latter part of the year 1894, was completed during the past year.

All the streets which were occupied by the temporary tracks during the construction were restored to their original use and Pennsylvania avenue, between Twenty-second and Twenty-sixth streets, was paved with asphalt, thereby

opening to the public a magnificent avenue leading directly to the Green street entrance of Fairmount Park.

The laying of the permanent track was completed and the subway put in full freight and passenger service. The locomotive coaling station, engine house, repair shop, freight station and other buildings in the Twentieth street yard were entirely completed and turned over to the Railway Company.

The final work upon the subway consisted of painting all the bridges, railings and other structural iron work and provided protection to the underside of the bridges from the locomotive gases.

This large and important work has been completed for a less sum than that provided by the ordinance of Councils. The actual cost of construction has been determined, but the exact amount of damages cannot be determined until suits now pending in the Courts are finally settled.

The following is a statement of the amount expended on this work, the amount paid for mandamuses and the balance on hand, etc.:

Amount paid for construction	$4,044,725 79
Amount paid for engineering and incidentals	266,482 38
Amount paid for damages and mandamuses	1,006,439 13
Total	$5,317,647 30
Unexpended balance	82,352 70
Total amount of loan negotiated	$5,400,000 00
Amount authorized by ordinance for the construction of this work was	6,000,000 00
Leaving a balance of loan not sold of	600,000 00

Widening of Delaware Avenue and Extension of City Piers.—That portion of Delaware avenue lying between Vine and South streets has been widened from 50 feet to a least width of 150 feet. The work which has been in progress for the last three years was practically completed

in 1900. A bulkhead wall of concrete was constructed in the docks and proper connections made to existing piers. The space behind the bulkhead wall was filled in from the bottom of the river to the new grade and the whole avenue paved with Belgian blocks on a gravel base.

The improved and changed conditions of the widened avenue provide every convenience for our commercial interests and its advantages have been enjoyed by the public practically during the whole of the year 1900, although the paving of certain portions of the avenue were not completed until the latter part of the year.

New piers have been constructed along the line of the widened portion of the avenue, covering a distance of about 5,300 feet of river frontage. The City has now constructed three new piers on City property at Race, Arch and Chestnut streets. The pier at Race street is complete, with the exception of the enclosing building, which is now under contract.

The open air pavilion on the upper deck of Chestnut street pier was well patronized by the public during the summer. The new pavilion pier at Race street will differ from that at Chestnut street in a number of particulars; a description of this pier, with other work in progress, is fully set forth in the detailed report of the Chief Engineer of the Bureau.

In accordance with an ordinance of Councils, authorizing negotiations with the owners of property on Delaware avenue, between Vine and Green streets, this Department is now engaged in making adjustment of damages, prior to the actual work of widening this portion of the avenue.

Improvement, Extension and Filtration of Water Supply.—On January 12, 1900, ordinances previously passed by Councils authorizing the improvement, extension and filtration of the water supply received your approval.

Immediately thereafter an engineering corps was organized under the direct supervision of Mr. F. L. Hand, Chief of Bureau of Water, and Mr. George S. Webster, Chief Engineer of Bureau of Surveys, to begin the study of the work and preparation of plans for carrying same into execution.

Ordinances to acquire the land needed for the purpose have been passed by Councils and approved, and the necessary legal measures to secure the same have been taken.

A testing station was constructed and equipped at the Spring Garden Pumping Station for the purpose of examining into the effects of the Schuylkill river water upon slow sand filters and studying the various local sands. The station, with its laboratories, filter beds and sedimentation basins, are fully described in the report made upon the subject by Mr. George S. Webster, Chief Engineer of Bureau of Surveys, whose full and elaborate report upon this subject will be found attached to the report of the Bureau of Surveys.

On July 20, 1900, bids were received for various kinds of sands, and experiments are now being conducted with the same to ascertain which is the best adapted for our use.

Excavations have been made of the drift and rock for a proposed gravity conduit to carry filtered water from the Torresdale filter to Lardner's Point and the plans are nearly completed for this work.

On December 12, 1900, bids were received for the construction of a 6,000,000 gallon filter plant, located adjacent to the Lower Roxborough Reservoir and designed to supply filtered water to Manayunk and the lower part of Germantown. The plan consists of five covered filters, with a filtered water basin of a capacity of 3,000,000 gallons.

No contract was awarded, as the proposals received were not satisfactory; the plans are now being changed, and when completed we will re-advertise the work.

A large number of plans and studies have been prepared

for the filter plants at Belmont, Upper Roxborough, Torresdale and Queen lane.

District Surveyors.—The Board of Surveyors held twenty-two stated meetings and nine special meetings during the year, five of which were road-day meetings, held for the purpose of hearing property owners interested in plans. Four hundred and thirty-two ordinances and petitions, comprising the construction of sewers, placing of new streets, the revision of territory, etc., were presented to the Board for action, all of which received careful consideration and were returned to Councils with the recommendation of the Board. Sixty-nine plans affecting the work of extensions of the Passenger Railway Companies were acted upon and approved by the Board.

The Surveyors in their several offices carried on the routine work of their districts successfully; the cash receipts and credits for work performed for the City exceeded the total expense of the thirteen districts by $48,135.41.

The following is a summary of the receipts and the expenditures of the District Surveyors for the year 1900 and in totals for the year 1899:

Summary of Receipts and Expenses of District Surveyors.

	Surveyors.	Cash Receipts.	Credit for Work done for the City.	Total Credit.	Expenses.				Balance Profit to the City.	Profit to the City in 1899.	Increase.	Decrease
					Salaries.	Pay of Assistants.	Miscellaneous.	Total.				
1	Thomas Daly.....	$6,927 29	$5,378 50	$12,305 79	$3,000 00	$5,864 62	$1,364 79	$10,229 41	$2,076 38	$7,392 89	.....	$5,316 51
2	Charles W. Close..	5,318 64	4,828 95	10,147 59	3,000 00	5,340 00	1,302 01	9,642 01	505 58	3,671 74	.....	3,166 16
3	Wm. C. Cranmer..	8,605 50	7,436 33	16,041 83	3,000 00	6,308 09	1,668 49	10,976 58	5,065 25	7,334 96		2,269 71
4	Frits Bloch.....	6,080 61	6,964 49	13,045 10	3,000 00	5,474 33	1,399 35	9,873 68	3,171 42	8,227 01	.....	5,055 59
5	Walter Brinton...	11,115 18	7,789 94	18,905 12	3,000 00	6,546 08	2,099 78	11,645 86	7,259 26	3,746 28	3,512 98	.....
6	Joseph Mercer....	15,091 14	10,224 43	25,315 57	3,000 00	8,699 97	2400 03	14,100 00	11,215 57	16,439 46	.....	5,223 89
7	Wm. K. Carlile....	3,869 95	6,157 94	10,027 89	3,000 00	4,399 96	1,594 87	8,994 83	1,033 06	6,267 55	.....	5,234 49
8	C. A. Sundstrom..	4,417 60	11,995 09	16,412 69	3,000 00	10,016 92	2,282 28	15,299 20	1,113 49	806 44	307 05	.....
9	Jos. C. Wagner....	8,283 49	8,128 71	16,412 20	3,000 00	10,560 36	2,139 64	15,700 00	712 20	*.....	809 52	.....
10	Jno. H. Webster, Jr.	8,574 36	7,814 38	16,388 74	3,000 30	7,209 42	1,804 06	12,013 48	4,375 26	4,161 77	213 49	.....
11	Joseph Johnson...	9,228 07	8,312 63	17,540 70	3,000 00	9,830 33	2,387 36	15,217 69	2,323 01	13,080 43	.....	10,757 42
12	J. H. Gillingham..	11,175 19	9,176 25	20,351 44	3,000 00	6,656 67	1,526 27	11,182 94	9,168 50	10,683 00	.....	1,514 50
13	H. M. Fuller.....	7,520 89	6,076 69	13,597 58	3,000 00	8,318 66	2,162 49	13,481 15	116 43	3,440 09	.....	3,323 66
	Total 1900....	$106,207 91	100,284 33	$206,492 24	39,000 00	$95,225 41	$24,131 42	$158,356 83	$48,135 41	$85,251 62	$4,843 04	$41,861 93
	Total 1899....	$106,973 51	$138,305 68	$245,279 19	39,000 00	$95,960 67	$25,164 22	$160,124 89	$85,251 62	$51,143 22	$42,890 59	$8,704 40

* Deficiency, 1899, $97.32.

Registry Division.—The work of renewing wornout registry plan books has been carried forward with satisfactory results during the year.

The following is a comparative summary of operations of the Registry Division of the Bureau of Surveys during the years 1899 and 1900:

	1899	1900
Number of certificates of registered owners issued	4,194	3,264
Number issued for use of Law Department	1,010	1,235
Receipts from certificates of registered owners	$1,058 50	$816 00
Receipts from miscellaneous sources	$115 68	$119 85
Number of original lots plotted	12,030	8,409
Number of transfers registered	29,176	30,055
Number of plans made for use of City Departments, Bureaus, etc	294	415
Number of examination of registry plan books made by the public	39,981	48,996
Number of descriptions of property filed for registry	41,206	38,464
Number of titles perfected	2,345	2,407
Number of certificates of legal opening of streets issued to Bureaus, etc	2,534	1,308
Number of certificates of registered owners in municipal lien cases for Law Department	1,713	1,849

During the past five years there has been a marked decrease in the number of searches made from the registry books. In the year 1896 the number of certificates of registered owners issued was 13,770. During the year 1900 the number was but 3,264, a decrease in five years of 76 per cent. in the number of certificates issued and in the revenue derived from this source.

This condition of affairs is due to the fact that title and trust companies, which formerly had searches made by the Registry Division, now make the searches from the plan books themselves, and issue their own searches to their clients, thus wearing out the City records without giving any return.

The plan books are valuable records and of great importance to the public, and if legislation were enacted fixing a reasonable charge for each examination it would aid in making the Division self-supporting and pay for keeping the books in fit condition to be used.

The following tables give a comparative summary of the operations of the Bureau of Surveys in the active construction of work; also the receipts and expenditures during the years 1899 and 1900:

Summary of Main, Branch and Private Sewers and Bridges Built during the years 1899 and 1900.

	1899.		1900.	
	No.	Linear Feet.	No.	Linear Feet.
Bridges	1	.....	4	.....
Subway bridges	7	.....	.....	.....
Intercepting sewer connections	3	4,372.20	5	2,847.00
Main sewers	12	10,085.60	31	23,779.52
Branch sewers	209	176,013.31	191	186,237.68
Private sewers	69	29,665.00	48	20,324.00
Subway sewers	3	2,368.00	.....	.....
Delaware avenue sewers	6	888.80	.....	.....
Total	310	*223,392.91	279	†233,188.20

* Equal to 42.31 miles.

† Equal to 44.16 miles.

Statement of Work upon Bridges during the years 1899 and 1900.

	1899.	1900.
Finished	1	2
Begun	1	1
Authorized	..	14
Planned	28	24

Statement of Receipts.

Year.	Receipts of Bureau.	Receipts of District Surveyors.	Total.	Increase.
1899	$41,839 72	$106,973 51	$148,813 23	.....
1900	$71,809 20	$106,207 91	$178,017 11	$29,203 88

Statement of Expenditures.

	1899.	1900.
Current expenses	$246,506 41	$245,122 78
For extensions	2,070,742 01	1,891,634 32
Totals	$2,317,248 42	$2,136,757 10

Bureau of Water.

Mr. Frank L. Hand, who had been acting Chief of the Bureau of Water since November 15, 1899, was appointed Chief of the Bureau from those having passed the Civil Service examination, to take effect March 1, 1900.

The work of this Bureau during the past year was largely in excess of its operations in any previous year. The ordinances passed and the work contemplated in connection with the improvement, extension and filtration of the water supply, indicate that the coming year will show marked improvements and a very great increase in the operations of this Bureau.

Improvement, Extension and Filtration of Water Supply.—In my previous report I referred to the appointment of engineers and draughtsmen, known as the corps on the "Improvement, Extension and Filtration of the Water Supply," who had been assigned to duty on this important

work under the direct supervision of the Chief of Bureau of Water and Chief Engineer of Bureau of Surveys.

During the past year, this corps has been engaged in perfecting detail plans for the construction of filter plants and the laying of large supply mains, etc., necessary and appurtenant to the improvement of the water supply. A detailed report of the work accomplished by this corps during the year has been made by Mr. George S. Webster, Chief Engineer of Bureau of Surveys, and will be found appended to the report of said Bureau; this report is worthy of careful perusal.

The City has secured the services of Mr. John W. Hill, of Cincinnati, Ohio, as consulting engineer to assist Messrs. Hand and Webster in the prosecution of this large and important work. Mr. Hill is an engineer of unquestionable ability and experience, and his services will be of incalculable value in establishing the filter plants and in developing the improvement of our water supply.

The financial statement of the Bureau of Water for the past year, shows an increase of $125,241.04 over the previous year. The total receipts for the year were $3,249,-195.24. The expenditures for the same period were $2,430,058.20, showing a net revenue of $819,137.04 over all expenditures both for permanent improvement and the cost of maintenance.

The total quantity of water pumped during the past year was 106,822,576,055 gallons. The daily average pumpage was 292,993,787 gallons, with an average daily consumption of 287,187,630 gallons, equal to 221.9 gallons per capita per day.

Many improvements have been made during the past year which have greatly improved the service and materially lessened the strain under which the Bureau has been working during the past few years.

At the Shawmont Pumping Station, the new engine and

boiler house has been completed and four new 5-million gallon engines installed, together with an electric light plant for lighting the station.

The old engine house at Belmont Pumping Station has been removed and a handsome and enlarged structure erected in its place. Three new 10-million gallon engines are now being erected on foundations prepared for them in the new house. They will be completed and in service during the present year. The boiler house at this station has been extended and four new boilers installed.

At the Belmont High Service Station, a new 5-million gallon pumping engine has been installed, also one of similar capacity at the Roxborough High Service Station.

The new station at Wentz Farm Reservoir, known as the Frankford High Service Station, has been completed and is now supplying water to Lawndale, Fox Chase and the intervening territory.

For years past the Department has recommended the removal of the suction mains at the Queen Lane Pumping Station and the construction of a new intake and pump wells. This work was accomplished during the past year and the new intake and pump wells are now in service. New electric generators and engines have also been erected at this station and two new pump chambers substituted for two old ones which were cracked.

At the Spring Garden Pumping Station, six new pump chambers were substituted for a like number of old ones which had become damaged through severe and continuous service.

Many other improvements and repairs of a minor nature have been made at the several pumping stations, all of which have greatly contributed to the betterment of the service; these improvements, together with the completion of certain other work now under construction will

assure an abundant supply of water throughout the City during the coming summer season.

On November 15, 1900, an ordinance was approved authorizing the construction of an independent high pressure fire service in the district bounded by Walnut street and Race street and the Delaware River and Broad street. As this is the business centre of the City, containing many large and valuable properties, the protection from fire which this system will insure will be of inestimable value.

The plans for this system provide for the construction of a pumping station on the river front, with engines to pump directly into the mains to be laid in all the principal streets within the boundary named. For the commencement of the work Councils have appropriated $300,000, which amount will be applied to the laying of mains, and until additional funds are provided for the construction of the engine house and the purchase of pumping engines the fire boats now in service on the Delaware river will be utilized for forcing water directly from the river into the mains. Proposals for furnishing and laying the mains for this service will be asked for in the early part of the present year, and the work will be promptly commenced and carried forward as far as the limited amount appropriated for the purpose will permit.

Pipe Laying.—Thirty-seven and eighty-one one-hundredths (37.81) miles of mains of various descriptions were laid during the past year, making an aggregate of 1,338.43 miles of water pipe now in use.

Included in this work was the completion of the 36 inch pumping main from the Roxborough Pumping Station to the reservoir, and the 30-inch distributing main from the Belmont reservoir to Thirty-eighth street and Lancaster avenue. A 48-inch supply main is now being laid from Wentz Farm reservoir, with 30-inch extensions to Lehigh avenue. Ninety per cent. of this work has been com-

pleted, and the remainder will be finished the early part of the present year.

Under the provisions of the loan for the improvement, extension and filtration of the water supply, additional large mains, from 20 to 48 inches in size, are to be laid in several sections of the City. These, when completed, will furnish an ample supply of water to districts in which, heretofore, the supply has been very inadequate.

The inspection of all the pipes used by the Bureau of Water is of the most exacting character, and results in the City getting the very best material.

The operations of the Construction and Repair Shop have exceeded those of any previous year, and have been carried on in a very satisfactory manner. Detailed statements of all appliances manufactured will be found in the report of the Superintendent.

The reservoirs are all in good condition, and, under the supervision of the General Superintendent, have been maintained during the year in a manner eminently satisfactory.

Reinspection.—During the year a reinspection has been carried on of all premises, for the purpose of ascertaining the correct amounts to be charged against them for water rents. Complete returns have been received from twenty-four wards and partial returns from others, which show a total of 121,903 properties inspected, of which 20,721 were delinquent for water rents amounting to $85,603.25. This work will be continued throughout the City as rapidly as the current business of the Bureau will permit. The facts developed, as far as the work has gone, justify the belief that when the reinspection is completed it will increase the receipts from water rents more than $100,000 per annum.

Waste of Water.—The problem of preventing the waste of water still remains unsolved. An ample supply of water

should be furnished for all necessary uses, for all the conveniences of modern life and for all manufacturing enterprises, but a wilful and careless waste must be criticised—aye, condemned. In days of plenty provide against want. How difficult it is to secure this provision in our water service, if the consumers are allowed to waste it without let or hindrance. It has been said that "we should have water as free as air." We do not, nor can we have it so, unless we go to the streams or lakes or ponds and use it where we find it. Air comes to our houses free, direct from the hands of its Maker, but vast sums must be expended to secure proper ventilation.

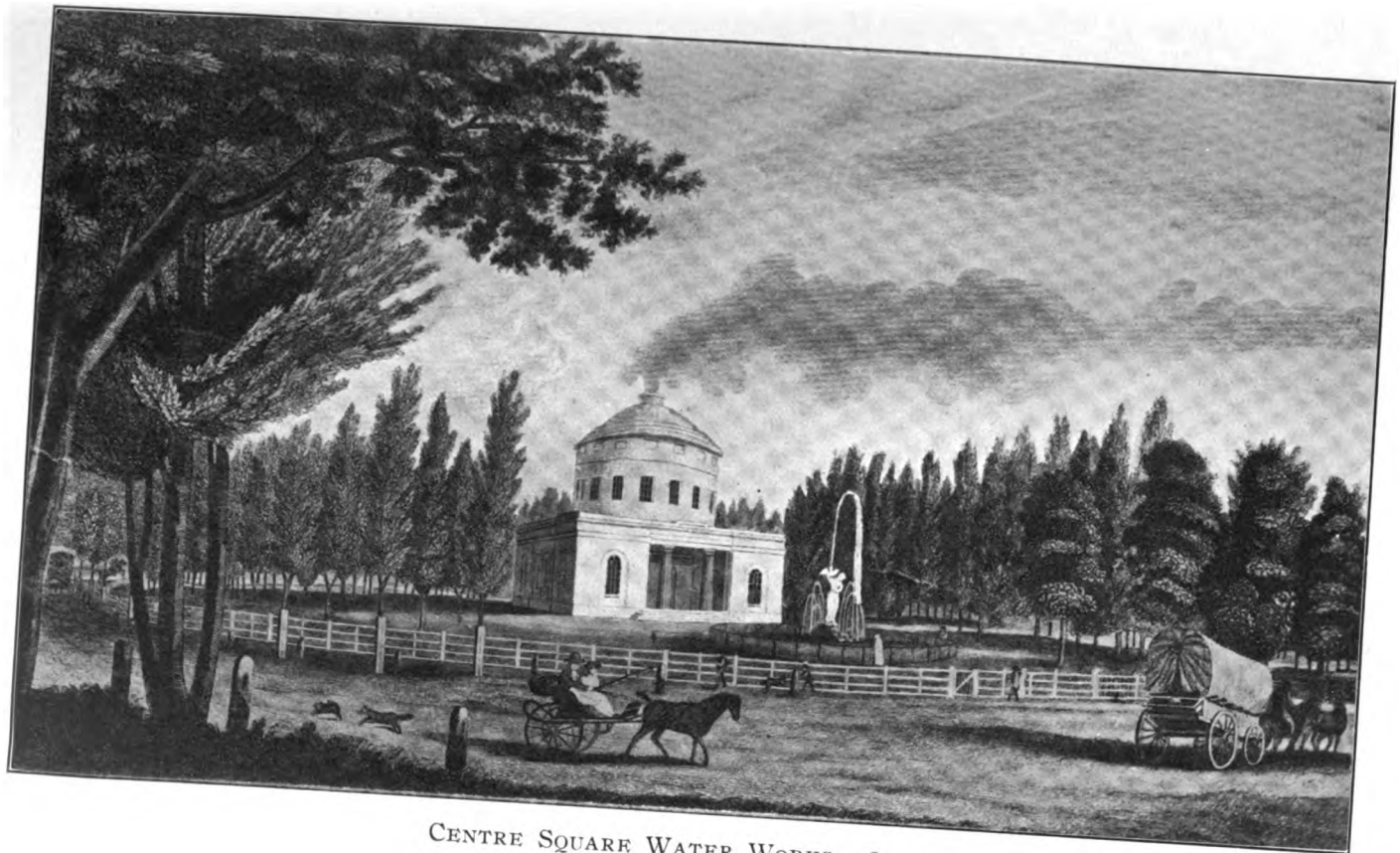
Water in our homes means pumping stations, pumping engines, reservoirs, mains and pipes, and each gallon of water represents a specific cost.

While the very best thought and most earnest effort has been applied to the business of securing an increase and betterment of our water supply, it is equally important that careful and earnest thought should be given to the work of preventing waste as far as possible.

The question of stopping the waste of water admits of no argument; that it can be done is without doubt, and Councils should, by proper legislation, put the Department in a position to protect the taxpayers of our City. Waste will not be permitted a very long existence with a meter on the service pipe.

History.—While the following has naught to do with the operations of the Bureau of Water during the past year, yet, as a matter of history, it may be interesting for our citizens to know that on January 27, 1801, one hundred years ago, the City of Philadelphia was first supplied with water from the Schuylkill river.

The water works system at that time consisted of two settling basins on the Schuylkill river, at the foot of Chestnut street, from which the water was conveyed through a



CENTRE SQUARE WATER WORKS, 1801.

6-foot tunnel to a pumping station at Twenty-second and Chestnut streets. From this station it was pumped sufficiently high to flow by gravity through a brick tunnel six feet in diameter, to Broad and Chestnut streets, and from the latter point to the Centre Square water works, located on the present site of the City Hall.

From the Centre Square water works the water was repumped to an elevation of thirty-six feet above the surface of the water in the well, and thence distributed through mains made of logs joined together with iron rings driven into the internal bore of the abutting ends of the wooden pipes.

At the time of starting the works there were two 6 inch water mains in Market street, one 4½-inch main in Chestnut street and another of the latter size in Arch street.

These works were continued in service until 1815, when a new pumping station at Fairmount (now occupied as an ice cream saloon and waiting room) was put in service.

The original appropriation, made under date of February 7, 1799, for the construction of Centre Square and Schuylkill water works, and for the distribution system, was $150,000, but by the year 1803 the expenditures for the work reached the amount of $295,422.09, or nearly twice the original estimate.

The following tables give the numbers and types of engines, locations and capacities of reservoirs and a comparative summary of the operations of the Bureau of Water, also the receipts and expenditures for the years 1899 and 1900:

Statement of the Number and Type of Engines and their Several Aggregate Capacities, at the Various Stations.

Pumping Station.	Designated Number of Engine or Turbine.	Type of Engine.	Designed Capacity in Million Gallons Per Day.	Total.
Spring Garden. Old Station	5	Compound Rotary	20,000,000	
Old Station	6	Simpson's Compound Rotary	10,000,000	
Old Station	7	Marine Compound Rotary	20,000,000	
Old Station	8	Worthington Duplex	10,000,000	
Old Station	11	Gaskill	20,000,000	
New Station	9	Worthington Duplex	15,000,000	
New Station	10	Worthington Duplex	15,000,000	
New Station	2	Holly	30,000,000	
New Station	3	Holly	30,000,000	170,000,000
Queen Lane	1	Southwark	20,000,000	
Queen Lane	2	Southwark	20,000,000	
Queen Lane	3	Southwark	20,000,000	
Queen Lane	4	Southwark	20,000,000	80,000,000
Belmont	1	Worthington Duplex	5,000,000	
Belmont	2	Worthington Duplex	5,000,000	
Belmont	3	Worthington Duplex	5,000,000	
Belmont	4	Worthington Duplex	20,000,000	38,000,000
Belmont Auxiliary	1	Worthington	2,000,000	
Belmont Auxiliary	1	Worthington	5,000,000	7,000,000
Roxborough	1	Southwark	12,000,000	
Roxborough	2	Worthington Duplex	5,000,000	
Roxborough	3	Worthington Duplex	7,500,000	
Roxborough	4	Worthington Duplex	4,000,000	
Roxborough	5	D'Auria	2,500,000	
Roxborough New House	4	Worthington Horizontal Compound	5,000,000	
Roxborough New House	5	Worthington Horizontal Compound	5,000,000	
Roxborough New House	6	Worthington Horizontal Compound	5,000,000	
Roxborough New House	7	Worthington Horizontal Compound	5,000,000	51,000,000
Roxborough Auxiliary	1	Worthington	5,000,000	
Roxborough Auxiliary	2	Worthington	5,000,000	10,000,000
Mt. Airy	1	Davidson	1,000,000	
Mt. Airy	2	Davidson	1,000,000	
Mt. Airy	3	Knowles	1,000,000	3,000,000
Chestnut Hill	1	Knowles	250,000	
Chestnut Hill	2	Worthington Duplex	500,000	750,000
Frankford	1	Marine Compound Rotary	10,000,000	
Frankford	2	Corliss Compound Rotary	10,000,000	
Frankford	3	Southwark Rotary	22,000,000	42,000,000
Frankford High Service	1	Holly Horizontal Compound	3,000,000	3,000,000
Fairmount. New House	1	Turbine Wheels	2,000,000	
New House	3	Turbine Wheels	5,330,000	
New House	4	Turbine Wheels	5,330,000	
New House	5	Turbine Wheels	5,330,000	
Old House	7	Turbine Wheels	5,100,000	
Old House	8	Turbine Wheels	5,100,000	
Old House	9	Turbine Wheels	5,100,000	33,290,000
Total				438,040,000

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

Name of Reservoir.	Location.	Date of Completion	Height above city Datum.	Capacity in gallons.
Fairmount.. Reservoir No. 1	East Fairmount Park	1815	94 feet.	26,350,000
Fairmount.. Reservoir No. 2		1821		
Fairmount.. Reservoir No. 3		1827		
Fairmount.. Reservoir No. 4, Section 1		1835		
Fairmount.. Reservoir No. 4, Section 2		1836		
Fairmount.. Reservoir No. 4, Section 3		1836		
Lehigh..... Section 1	Sixth and Lehigh avenue	1852 and 1871	114 "	28,910,000
Lehigh..... Section 2				
Lehigh..... Section 3				
Spring Garden	Twenty-sixth and Master streets	1844	120 "	12,900,000
Corinthian	Corinthian avenue and Poplar street	1852	120 "	37,341,400
East Park.. Section 1	East Fairmount Park	1887	133 "	62,738,000
East Park.. Section 2		1888		306,400,000
East Park.. Section 3		1889		319,480,000
Queen Lane North Basin	Thirty-third street and Queen lane	1894	238 "	205,620,000
Queen Lane South Basin				177,480,000
Frankford	Oxford Turnpike and Comly street	1877	167 "	36,046,000
Belmont	West Fairmount Park	1870	212 "	39,758,000
Mount Airy	Allen's lane and Mower street, Germantown	1851	383 "	4,546,000
Roxborough	Ridge and Shawmont avenues	1866	366 "	12,838,000
New Roxborough. North Basin	Port Royal avenue and Ann street	1893	414 "	71,594,000
New Roxborough. South Basin				75,433,000
Manatawna tanks—2	Manatawna and Ridge avenues	1878	442 "	107,000
Chestnut Hill tank	Hartwell avenue and Chestnut Hill R. R., Chestnut Hill	1860	481 "	52,000
Belmont Stand Pipe	West Fairmount Park	1895	364 "	106,000
Roxborough Stand Pipe	Port Royal avenue and Ann street	1895	490 "	106,000
Frankford Stand Pipe	Oxford Turnpike and Comly street	1900	300 "	106,000
Total				1,417,966,400

Statement of Pumpage for the years 1899 and 1900.

	1899 Gallons.	1900. Gallons.
Pumped to reservoirs.....	107,991,371,604	106,822,576,055
Equal to gallons pum'd 100 ft. high.	231,813,686,728	218,119,532,621

NOTE.—The "pumped to reservoirs," etc., includes 2,118,042,344 gallons of re-pumpage to higher levels at Belmont, Roxborough, Mt. Airy, Chestnut Hill and Frankford High Service Stations, which, deducted from the total pumped, gives a total pumpage, from rivers, of 104,704,533,711 gallons.

The quantity stored in reservoirs on December 31, 1900, was 118,951,289 gallons less than that stored on December 31, 1899. This quantity added to the total pumpage from rivers, makes the total consumption for 1900, 104,823,485,000 gallons. The cost of pumpage is based on the total pumpage. The consumption per capita is computed from the average consumption during 1900, of 287,187,630 gallons per day.

	1899. Gallons	1900. Gallons.
Pumped by water power.....	8,618,634,347	5,726,488,277
Pumped by steam power.....	99,372,737,257	101,096,087,778
Largest quantity pumped in 24 hrs.	342,368,144	353,295,438
Smallest quantity pumped in 24 hrs.	213,254,250	106,565,758

Year.	Average Daily Consumption.	Average consumption in gallons per capita per day, estimating the population at *	Cost of 1,000,000 gallons pumped 100 feet high.
	Gallons.	Gallons.	
1900.	287,187,630	221.9	$3 71

* 1900, 1,293,697 U. S. Census.

The consumption during the year 1900 was 1,053,266,-022 gallons less than the previous year.

The cost of pumping one million gallons one hundred feet high, during 1900, was $3.71, or 81 cents in excess of that during the previous year. This increased cost of pumpage is due to extensive repairs to pumping engines and boilers and to an increase of about 6 per cent. in the cost of coal.

About eight per cent. of the total pumpage was by water power, the turbine wheels using	171,794,648,310 gallons
To pump	5,726,488,277 gallons

Statement of the Total Pipe Laid and of the Other Work Done During the Years 1899 and 1900.

YEAR.	PIPE LAID.			* PIPE RELAID	FIRE HYDRANTS PLACED IN POSITION.			SUBSTITUTED FOR DEFECTIVE HYDRANTS.			Fire Hydrants in Use.	New Water Attachments.
	Feet.	EQUAL TO			New Style.	Old Style.	Total.	New Style.	Old Style.	Total.		
		Miles.	Feet.	Feet.								
1899	128,793	24	2,073	† 86,727	711	.....	711	188	3	191	12,170	59,52
1900	196,178	37	818	‡ 32,282	450	.....	450	288	.....	288	12,620	5,148

Total Pipe Laid, 1,338.43 miles.

*Adds nothing to feet in ground.

† 1899 Pipe taken up exceeds the quantity relaid 3,951 feet.

‡ 1900 Pipe taken up exceeds the quantity relaid 2,045 feet.

Statement of Receipts and Expenditures for the Years 1899 and 1900.

	Receipts. 1899.	Receipts. 1900.
Receipts from water rents	$2,856,451 78	$2,967,497 39
Receipts from fractional rent	54,075 44	55,954 52
Receipts from water pipes	80,644 23	98,465 15
Receipts from City Solicitor's office	50,627 83	45,488 06
Receipts from penalties	40,229 09	38,234 59
Receipts from delinquent rent	31,787 30	32,426 60
Receipts from Chief Engineer's office	4,590 42	6,300 21
Receipts from searches	942 75	173 75
Receipts from delinquent penalties	4,605 36	4,654 97
Total	$3,123,954 20	$3,249,195 24

	Expenditures. 1899.	Expenditures. 1900.
Current expenses	$1,461,583 36	$1,574,704 95
For extensions	222,973 90	855,353 25
Total	$1,684,557 26	$2,430,058[20

Bureau of Highways.

The report of the Chief of this Bureau sets forth in detail the variety and great amount of work done on the highways and upon the bridges of the City during the year 1900. To the Chief and his assistants great credit is due for the able and efficient manner in which they have discharged their duties.

The total expenditures for the year amounted to $3,047,672.69, and were $540,050.17 greater than the previous year; but the amount of work done, both new and in repairs, is much greater than the above figures would indicate.

The business of the Bureau of Highways consisted of all

classes of work, covered by seven hundred and thirty-seven (737) contracts, as follows: Two hundred and thirty-four (234) for repaving, one hundred and ninety-nine (199) for new paving, one hundred and seventy (170) for grading and one hundred and thirty-four (134) of a miscellaneous character; the amount of work accomplished was even greater than that performed during the year 1899, when all previous records were eclipsed.

The work of the Bureau in laying new pavements was commenced early in the spring and continued uninterruptedly; at the close of the year there was completed 75,027 linear feet of new paving, 75,782 linear feet of new macadam and 207,593 linear feet of repaving, making a total of 358,402 linear feet, covering a distance of more than sixty-seven miles.

The repaving consisted of removing the old cobble and rubble pavements and replacing them with sheet asphaltum, granite, vitrified and slag block pavements. The appearance of the streets thus repaved, their increased adaptability for heavy traffic, their greater comfort to all using them and the facility with which the new pavements can be kept clean, speak volumes.

Councils, recognizing the necessity and importance of continuing the work of repaving, have appropriated for the year 1901 $750,000, and like appropriations should be made each year until every cobble and rubble pavement in the City is removed and replaced with the best character of improved pavement.

One million six thousand one hundred and seventy-three (1,006,173) cubic yards of grading has been done during the year. The work was principally done to provide new streets and to open new lines of travel in suburban districts. A portion of this work was executed by builders, at no expense to the City, in order to facilitate the paving of the streets and to make their properties on the line of the streets marketable.

The removing of the old square curbs at the intersections of streets and replacing them with curved granite curbs was carried on to the full extent of the amount appropriated for the purpose.

The curbing of our streets is an essential feature, and has much more effect upon the appearance of the completed street than the average citizen is aware of. In most instances where streets are repaved, the old curb is so worn and rounded by impact with the wheels of vehicles and the action of the weather that it has a distressing effect, causing the streets that are repaved with improved pavement to appear ragged at the edges and incomplete. A dressed granite curb will last for all time, and not only beautifies the street, but, by its neat appearance, enhances the value of the property in front of which it is placed; therefore, an ordinance should be passed making it obligatory that a dressed granite curb shall be set upon all streets prior to paving or repaving.

Fourteen and thirty-five one-hundredths (14.35) miles of macadamized roadway were constructed during the year. All the unpaved and macadamized highways which the City maintains received careful attention, and were kept in excellent condition throughout the year. Sixty thousand (60,000) tons of broken stone were delivered, spread and rolled over them during the year, covering a distance of forty-seven miles. The attention bestowed upon these roads has been unremitting, and at no time have they been in better condition than at the close of the past year.

The sprinkling of macadamized roads began on April 10 and continued until December 13. The good results derived from this work and the satisfaction to those using the roads is beyond question.

Systematic inspections of a large number of sewers were made during the past year; many small breaks were discovered, and many sewers found to be obstructed by the accumulations of dirt. The dirty sewers were cleaned and

the breaks promptly repaired, thus preventing more serious damage.

A number of extensive repairs and reconstructions were made under the emergency contract in connection with the repairs to sewers, the most important of which was the reconstruction of a portion of the Mantua creek sewer. This sewer runs under the buildings through the block bounded by Mantua avenue, Brown street, Thirty-seventh and Thirty-eighth streets. It had been built in filled ground, at a depth of about thirty feet, and was found to be in a very dangerous condition. The work of repairing it was a difficult and dangerous undertaking, but was accomplished successfully and without any mishaps.

The ordinance of Councils approved November 10, 1900, appropriated to the Bureau of Surveys $25,000 for the reconstruction of the Mantua creek sewer on Thirty-seventh street, from Mantua avenue to Brown streets, and on Brown street, from Thirty-seventh street to Thirty-eighth streets. The purpose of the new sewer is to divert the course of the old sewer, which now runs under the houses, and, when completed, will remove a continual source of danger.

In repairing the paved streets of the City, we followed the system adopted in the year 1899. The contract was awarded for the lump sum of $384,950, and required the contractor to repair and maintain in good condition throughout the entire year all streets except those paved with asphaltum and granolithic. Work was begun by the contractor early in the season and prosecuted in a systematic and diligent manner.

The repairs to streets paved with sheet asphalt and granolithic were made at a price per square yard.

Thirty-four (34) miles of streets were opened by the Bell Telephone Company for the purpose of laying conduits. The United Gas Improvement Company opened thirty-six miles in order to lay mains; it also made 56,000 openings for making house connections, repairing leaks,

etc.; the pavements disturbed by both companies were promptly and properly reinstated.

The relations of this Department with corporations occupying the streets have, in most instances, been pleasant and without friction, the companies generally evidencing a desire to do their work properly.

Very many of our asphalt streets which had been paved years ago were worn to such an extent as to make them dangerous to travel; those in the worst condition were selected for attention—the old worn-out surface was removed and the streets resurfaced with new material from curb to curb. One hundred and twenty-seven thousand eight hunhundred and eighty-five (127,885) square yards were resurfaced during the year, giving the City seven miles of new asphalt paving, under a guarantee of ten years for maintenance.

Repairs have been made to many of our bridges, at an expense of $129,765.62, a detailed account of which will be found in the report of the Superintendent of Bridges. Notwithstanding the large amount of work which was done upon bridges during the past year, there is still a number which require extensive repairs, also many which are sadly in need of painting.

We have three hundred and eight (308) bridges, under the care of the Bureau of Highways, and a thorough inspection of their condition and a careful estimate of the amount required for urgent repairs and painting, fixes the cost at $155,094.

The appropriation for this work for the year 1901 is only $15,000, and unless Councils make additional appropriation for repairs, many of our bridges will so deteriorate as to render them unsafe, making it compulsory upon the Department to close them to travel.

The License Clerk reports that the collections by the Receiver of Taxes for licenses issued by him amounted to

$136,055.73, and that the number of permits issued were 19,359.

The following table shows the classification of street pavements laid during the year, and their mileage, also the total mileage of the various kinds of street pavements on December 31, 1900.

General Pavement Statistics.

Kinds of Pavements.	Laid During 1900.		Making Total in City, Dec. 31, 1900.	
	Sq. Yds	Miles.	Sq. Yds.	Miles.
Sheet asphalt	461,343	34.61	4,174,626	269.43
Asphalt block			180,702	19.39
Granite block	137,242	6.34	5,912,572	358.59
Cobble or rubble			1,822,070	85.04
Vitrified brick	118,857	8.32	2,055,822	127.84
Granolithic			72,726	12.77
Slag block	30,413	4.25	71,280	9.82
Macadam	155,004	14.35	2,177,186	207.93
Total	902,859	67.87	16,466,984	1,090.62

In addition to the paved and macadam streets, there are 419 miles of unpaved streets or dirt roads.

Philadelphia is the best paved city, and has more miles of improved pavement than any municipality in the Union. We have 1,005.58 miles of streets paved with Belgian block, sheet asphalt, vitrified brick or block and other material of improved character, leaving but 85.4 miles of the antiquated pavements of rubble and cobble stones.

The disgrace of badly paved streets which was present with us a few years ago has been removed by the repaving with improved pavement under the appropriations made for the purpose.

The question of removing the remaining cobble and rub-

ble pavements and replacing them with pavements of an improved nature is one of an appropriation of funds for repaving; this is a question for Councils, and if they will provide sufficient funds for the purpose the few miles of objectionable cobble and rubble pavements will soon be removed.

The following tables give comparative statements in detail of the work done during the years 1899 and 1900, and of the receipts and expenditures of the Bureau of Highways:

Comparative Statement of Work Done.

	1899.	1900.	
New paving	306,144	282,620	linear feet
Macadamizing (new)	43,442	75,782	linear feet
Grading	1,451,379	1,006,173	cubic yards
New footway paving	111,861	122,885	square yards
Repairs to paved streets	1,901,934	1,008,152	square yards
Footways repaved	30,749	34,280	square yards
Ditches repaved	83,992	76,670	square yards
Gutter stone laid	65,042	42,119	linear feet
Crossing stone laid	19,158	38,115	linear feet
Tramway stone laid	2,106	.....	linear feet
Curb stone reset	386,164	350,329	linear feet
Wooden trunks	6,647	4,967	linear feet
Brick and stone drains	2,950	992	linear feet
Hand railings	3,666	2,675	linear feet
Broken stone used	50,000	60,000	tons
Macadamizing (resurfacing)	179,697	245,402	linear feet
Curved curb corners	37,066	30,434	linear feet
New curb stone set	.....	150,963	linear feet
Vitrified brick and stone gutters	.....	27,567	linear feet
Resurfacing sheet asphalt	.....	127,885	square yards
Footway, curb and railroad notices served	57,964	70,911	

Summary of Work Done in Improved Pavements—New Streets.

	1899.		1900.	
	Square Yds.	Linear Feet.	Square Yds.	Linear Feet.
Granite blocks	7,715	3,052	21,901	5,000
Sheet asphalt	37,260	11,035	171,157	49,022
Vitrified bricks	142,107	47,375	59,150	21,005
Asphalt blocks	2,702	685	.....	.....
Macadamizing	75,408	43,442	155,004	75,782
Total	265,192	*105,589	407,212	†150,809

Replacing Cobblestone With Improved Pavements—Old Streets.

	1899.		1900.	
	Square Yds.	Linear Feet.	Square Yds.	Linear Feet.
Granite blocks	7,106	2,428	115,341	28,508
Sheet Asphalt	551,121	221,695	290,186	133,683
Vitrified bricks	17,735	6,384	59,707	22,925
Slag block	22,985	13,490	30,413	23,482
Total	602,947	*243,997	495,647	†207,598

* 1899.—Total amount of new paving 349,586 linear feet, equal to 66 miles, 1,106 linear feet.

† 1900.—Total amount of new paving 358,402 linear feet, equal to 67 miles, 4,642 linear feet.

In addition to the work done by the City in the paving and repaving of streets, with improved pavement, the following statement shows in detail the amount of work done by the passenger railway companies during the year 1900:

	Repaving Linear Feet.
Granite blocks	9,712
Granite blocks (old blocks relaid)	69,695
Vitrified bricks	12,613
Slag blocks	930
Total	92,950

Equal to 17 miles, 3,190 linear feet at an estimated cost of $100,000.

Comparative Statement of Receipts.

Years.	Receipts.	Decrease.
1899	$142,164 20	.....
1900	136 055 73	$6,108 47

Comparative Statement of Expenditures.

	1899.	1900.
Current expenses	$922,893 14	$1,055,865 38
For extensions	1,584,729 38	1,991,807 31
Total	$2,507,622 52	$3,047,672 69

Board of Highway Supervisors.

During the past year, this Board has held twenty-four regular meetings, acted upon and approved of plans for underground structures, vaults, conduits, sidings and other work authorized by Ordinances of Councils in and upon the streets of the City.

The transactions of the Board and its employees are

fully set forth in the reports of the Secretary and the Chief Draughtsman.

It is not generally known, but is, nevertheless, a fact, that the draughting division of the Board of Highway Supervisors is more than self-supporting. The earnings during the past year, over and above all expenditures, amounted to $4,376.90. It is one of the few branches of the City Government that is operated at a profit to the City.

During the year the force in the draughting division has been increased by the appointment of additional draughtsmen. This division, under the careful and efficient management of Mr. Jules T. Jollivet, Chief Draughtsman, has accomplished much valuable work for the City. One hundred and eighty-two (182) plans of sub-structures, covering a distance of 36.2 miles, have been added to our records, making a total to date, of 243 miles.

These plans are of incalculable value and it is a satisfaction to know that the additions to our records are being made without cost to the City.

The value of the records of this Board was probably never more fully appreciated than when, recently, we discussed the laying of the proposed 48-inch water main, from York street on the north to Wolf street on the south. A reference to the records at that time showed, in a few minutes, that but one street was available for the purpose. Without them it would have involved much time and expense before the desired and necessary information could have been obtained.

The National Commission appointed for the purpose of investigating the lines along the proposed extension of the pneumatic tube system for the rapid delivery of mail in this City, recently examined our maps to ascertain the physical difficulties to be overcome in laying the same.

The gentlemen comprising the Commission attested to the value of our records by stating that the information received by them was more comprehensive than they had been able to obtain in any other City.

The following is a statement of the number of permits authorized to be issued during the year to the several companies maintaining underground structures:

Edison Electric Light Company	12
Union Traction Company	7
Bell Telephone Company	532
The United Gas Improvement Company	493
Estate of Stephen Girard	9
	1053

The following is a summary of the transactions of the Board, of the work of the draughting division and of the receipts and expenditures for the years 1899 and 1900:

Transactions of the Board of Highway Supervisors.

Permits Authorized to be Issued.	1899.	1900.
For vaults	16	12
For railroad tracks, curves and turnouts	74	67
For underground pipes	9	15
For electrical conduits	578	560
For erecting bridges	4	1
For awnings	279	*63
For tunnels	.....	2
For platform scales	.....	1
For drinking fountain	.....	1

* Awnings transferred to Bureau of Highways by Ordinance of Councils, March 22, 1900.

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

	1899.	1900.
Plans of iron awnings furnished	295	*63
New street record plans prepared	172	182
Blue print plans placed on file	246	159

Receipts and Expenditures.

	1899.	1900.
Receipts	$21,844 36	$15,864 71
Expenditures	8,797 01	9,858 13
Excess of receipts	$13,047 35	$6,006 58

Recapitulation.

	1899.	1900.
Amount of earnings	$25,117 39	$14,235 03
Amount outstanding from previous years	2,256 18	5,529 21
	$27,373 57	$19,764 24
Amount received and deposited with City Treasurer	21,844 36	15,864 71
Amount outstanding	$5,529 21	$3,899 53

Bureau of Street Cleaning.

This Bureau continued, during the year 1900, the work so satisfactorily done in previous years. The streets of the City have been kept clean and the garbage and other offal have been removed daily and disposed of in a satisfactory and sanitary manner.

While the appropriations to this Bureau have increased and were greater for the past year than ever before, the amount of work required under the contracts has proportionately increased owing to the growth of the City and the demands of the public for better service.

The Department has been very exacting during the year and has imposed penalties for neglect by contractors, amounting to $9,299.00.

During the year, 215,461 miles of streets and 1,128,423 inlets have been cleaned, from which were removed 192,125 cart loads of dirt. From buildings there were removed 568,636 loads of ashes and 15,253 loads of dry waste and 224,256 loads of kitchen garbage. There were also removed 10,532 dead animals.

From the footway and highway bridges spanning the Schuylkill River and from streets in the business centre of the City, there were removed 6,099 single and 290 double cart loads of snow. The entire cost of this work, including its supervision and the office expenses of the Bureau, was $945,702.62.

Tabulated statements of work done during the year and the specifications under which work will be done during the year 1901, are printed with the report of the Chief of Bureau.

On November 22, 1900, after public advertisement, proposals were received and contracts awarded to the lowest bidders for the year 1901.

The contracts for street cleaning, etc., for the year 1901, in addition to the work heretofore done, will include the cleaning of private alleys and undedicated paved streets; this work will materially improve the sanitary conditions of the City.

The specifications for 1901 contain several improvements not embraced in those of previous years, among

which is the use of dust-tight bags on certain streets for the reception of dry dirt and the removal of wet dirt or mud in metal-tight carts or wagons.

As stated in my previous report, the extension of time in the contracts for the cleaning of streets, etc., and the removal and disposal of garbage—say for five years—will, in my judgment, do much towards effecting a more efficient and less expensive service than under the present system of one year contracts.

The following is a statement in detail of the operations of the Bureau of Street Cleaning during the year 1900; also the totals for the year 1899:

Total Work During the Year 1900.

DISTRICTS.	CLEANED.					REMOVED.					
	Squares.	Inlets.	Crossings.	Market Houses.	Snow from Fire Plugs.	Number of Dead Animals.	Number of Loads. Dirt.	Ashes.	Dry Waste	Garbage.	Number of complaints of all kinds.
First	389,449	195,798	54,870	622	4,306	1,790	41,609	112,253	4,660	35,747	270
Second	390,621	211,319	51,900	1,224	2,450	2,237	48,337	106,467	4,317	42,337	87
Third	254,131	86,703	26,400	324	3,329	2,119	12,223	67,908	2,918	46,837	257
Fourth	746,258	476,688	86,020	4	4,520	2,344	33,160	126,122	1,276	52,434	441
Fifth	350,965	123,731	39,108	.....	1,417	2,042	45,594	155,886	2,082	46,901	302
Sixth	23,187	34,184	3,492	.....	1,526	.....	11,202	.....	.....	.....	12
Totals, 1900..	2,154,611	1,128,423	261,790	2,174	17,548	10,532	192,125	568,636	15,253	224,256	2,248
Totals, 1899..	2,048,454	1,411,787	501,070	2,156	22,817	8,702	202,799	625,459	.....	199,357	2,222

Bureau of Lighting.

The total number of lamps lighted and under the supervision of this Bureau on December 31, 1900, was 34,140, divided as follows:

Gas lamps maintained by The United Gas Improvement Company	19,971
Gasoline lamps furnished by the Pennsylvania Globe Gas Light Company	13,966
Gas lamps maintained by the Northern Liberties Gas Company	80
Gas lamps maintained by the Department of Charities and Correction	123

In addition to the gas and gasoline lamps enumerated above, there are 8,519 electric arc lights under the care of the Department of Public Safety (Electrical Bureau), and fifty electric arc lights maintained by the Board of Directors of City Trusts, located on Delaware avenue and Front street, between Vine and South streets.

The total number of lighted lamps of all descriptions on December 31, 1900, was 42,709.

Gasoline lamps are placed in alleys and in those sections of the City where gas mains are not yet laid, nor electric lights erected. These lamps are of the Maloney Company patent, and furnished by the Pennsylvania Globe Gas Light Company, under contract with the City as authorized by Ordinance of Councils. During the past year this company has lighted and maintained its lamps in a thoroughly satisfactory manner.

The lamps maintained by The United Gas Improvement Company, in accordance with the terms of its lease, have been well cared for and lighted and extinguished regularly. The contract between the City and The United Gas Improvement Company requires said company to erect three hundred new gas lamps annually and to maintain them.

Since December 1, 1897, the date when the lease went into effect, this Department has forwarded to The United Gas Improvement Company the locations for nine hundred new gas lamps; of this number the company has erected seven hundred and sixty-nine, leaving a balance of one hundred and thirty-one lamps to be erected.

The three hundred new gas lamps provided for in the lease not being sufficient to meet the rapid development of the City, the Department, in the year 1898, by mutual agreement, arranged with The United Gas Improvement Company to discontinue the lighting of certain gas lamps because of their proximity to electric lights, and re-erect them in other locations on streets where there were no lamps. Under this arrangement a large number of gas lamps have been discontinued and relocated in other localities by the said company, without cost to the City.

The following comparative statement shows the number of gas and gasoline lamps, also the expenditures of the Bureau of Lighting during the years 1899 and 1900:

	1899.		1900.	
	Number of Lamps.	Cost during the year	Number of Lamps.	Cost during the year.
Gas lamps maintained by The United Gas Improvement Company	*19,922	.....	*20,137	.....
Gasoline lamps	13,314	$279,559 61	13,966	$286,268 59
Gas lamps supplied by the Northern Liberties Gas Company	92	1,858 44	80	1,693 13
Gas lamps maintained by the Bureau of Correction	*236	.....	*231	.....
Salaries and office expenses	.....	$5,758 44	.....	6,572 20
Total	33,564	$287,176 49	34,414	$294,533 92

* Not lighted because of proximity to electric lights.

	1899	1900
Under care of The United Gas Improvement Company	180	166
Under care of Bureau of Correction	108	108

Bureau of Gas.

The duties of the officials of this Bureau are to ascertain the quality and illuminating value of the gas supplied to the City by The United Gas Improvement Company, and to determine the accuracy of meters whenever complaint is received from any consumer doubting the correctness of the gas bill rendered. The Chief Inspector of Meters and his assistants have been zealous and faithful in the discharge of their duties.

During the past year, two thousand three hundred and forty (2,340) tests were made, to determine the quality and illuminating value of the gas furnished; the results have been extremely satisfactory.

The average candle power of the tests was as follows:

January	23.01
February	22.70
March	22.90
April	22.90
May	23.00
June	22.70
July	23.00
August	22.96
September	22.60
October	22.80
November	22.80
December	22.80
Maximum monthly average	23.01
Minimum monthly average	22.60

The results of these tests demonstrate that the quality and illuminating power of the gas supplied by The United Gas Improvement Company is in accordance with the terms of its contract with the City.

During the past year, there were but three requests for the examination of meters. The examinations showed that two of the meters were slow and one fast, but in no case did the error reach as high as one per cent. either way.

This Bureau is operated without any expense to the City, The United Gas Improvement Company, in accordance with the terms of its lease, paying into the City Treasury annually the sum of $10,000. This amount is then appropriated by Councils for the expense of the Bureau. During the past year the entire amount was expended, $9,500 for salaries and $500 for printing, stationery, incidentals, etc.

The lease of the Philadelphia Gas Works to The United Gas Improvement Company went into effect on December 1, 1897. Since that date, the company has expended enormous sums of money in the laying of large and small mains and in improving the plant and equipping it with the most modern machinery for the manufacture of gas, so that to-day, the gas consumers of Philadelphia enjoy greater facilities than were ever experienced in the history of the Philadelphia Gas Works.

City Ice Boats.

On January 1, 1900, the three City Ice Boats were placed in active commission and rendered efficient service in keeping the channel of the river open to navigation and in assisting vessels caught in the ice. Boats No. 1 and 2 were in commission forty-five days and Boat No. 3, fifty-nine days.

On April 9, 1900, Captain H. E. Melville, Superintendent of City Ice Boats, died. He had been in active service in connection with the Ice Boats for twenty-eight years and by his death the City loses the services of an efficient and capable officer. James S. Jefferson was appointed to succeed him on June 1, 1900.

During the National Republican Convention which was held in this City in the month of June, the three City Ice Boats were placed in service and on June 20, took out

six hundred visitors on a river excursion. On the following day they were returned to their docks and laid up for the summer.

Twenty-nine thousand nine hundred and forty-nine (29,949) dollars and five (5) cents were expended during the year for repairs, general maintenance and operating expenses. One thousand three hundred and fifteen (1,315) dollars and twenty-nine (29) cents were received from the sale of old material and for assistance rendered vessels, the latter sum being paid into the City Treasury.

All repairs necessary to place the boats in condition for service, were made during the summer months and, at this date—January 2, 1901—they are ready for duty should their services be required to keep navigation open and the river free from obstruction by ice.

The following tables give a comparative summary of the receipts and expenditures of the City Ice Boats for the years 1899 and 1900:

	1899.	1900.
Amount received for towage and assistance rendered		$1,250 00
Amount received for sale of material	$72 45	65 39
Total paid to City Treasurer	$72 45	$1,315 39

	1899.	1900.
Total amount of warrants drawn	$20,834 70	$29,949 05
Deduct cash paid City Treasurer	72 45	1,315 39
Total	$20,762 25	$28,633 66

Director's Office.

With the increased growth of the City and the large amount of work now being done under the supervision of the several Bureaus of the Department, the detail work of this office has increased proportionately.

The following is a comparative summary of the expenditures of the Director's office for the years 1899 and 1900:

Item.		1899.	1900.
1	Salaries	$20,420 00	$20,560 00
2	Keep of horses	1,400 00	1,390 00
3	Printing, stationery, etc.	2,438 42	2,353 97
4	Appraisement of Philadelphia Gas Works	2,750 00	.....
5	To pay bills for gas pipe, etc	455 79	.....
6	To pay Pennsylvania Railroad Company for expenses incurred in removing debris washed upon tracks at Powelton avenue, and for expenses incurred in repairing round house and tracks at Thirty-first and Powelton avenue	437 70	.....
4	To reimburse John J. Cassiday for gas pipe paid for by him	.....	175 50
5	To pay a verdict obtained against Thos. L. Hicks and Patrick McGinn	.....	436 03
	Total	$27,901 91	$24,915 50

The suggestions for new work and recommendations for improvement in the several Bureaus, have been stated in detail under their respective heads.

In this report, I have made but a brief abstract of the operations of the past year, but a complete record is to be found in the reports of the Chiefs of the several Bureaus which are hereto attached and which are worthy of a careful perusal by those desiring to become acquainted with the many details of our City government, in so far as they pertain to the Department of Public Works.

The appropriations, expenditures and receipts of the De-

partment of Public Works for the year 1900, are set forth in the following table in detail by Bureaus and in totals for the year 1899:

The following is an abstract from the ordinance making an appropriation to this Department for the year 1901, with a statement of the balances available from previous years for work ordered and for which contracts have been executed:

Bureaus.	Annual Appropriation for the Year 1901.	Balance Available from Previous Years.	Total.
Director's office	$24,820 00		$24,820 00
City ice boats	26,830 00		26,830 00
Gas	10,000 00		10,000 00
Highways	1,981,498 00	$805,082 23	2,786,580 23
Lighting	307,531 00		307,531 00
Street Cleaning	962,704 00		962,704 00
Surveys	841,860 00	2,515,441 43	3,357,301 43
Water	1,192,733 00	5,223,955 14	6,416,688 14
Total	$5,347,976 00	$8,544,478 80	$13,892,454 80

In conclusion, permit me to mention the earnest and faithful services of the employees in my office and also to express my appreciation of the loyal support given me at all times by the Chiefs of the several Bureaus of this Department, as well as their subordinates.

For myself and them, I desire to thank you for the active and continued support you have given us in the administration of the important affairs of this Department.

Respectfully submitted,

WM. C. HADDOCK,
Director.

LIC WORKS DURING THE YEAR 1900,

lance ailable 1901.	Total.	Amount merging.	Receipts.	Number of employes Dec. 31, 1900.
D.....	$24,915 50	$530 00	.....	9
C.....	33,469 05	461 45	$1,315 39	22
G.....	10,000 00	.....	3 00	6
H 05,082 23	3,871,080 79	3,580 61	136,055 73	114
B.....	.....	.....	15,864 71	13
L.....	295,928 92	506 83	.....	4
S.....	960,134 12	1,224 88	.....	14
S 15,441 43	4,695,232 60	9,570 74	71,809 20	*279
D.....	.....	.....	106,207 91	13
W 23,955 14	7,668,284 09	30,645 38	3,249,195 24	1,521
44,478 80	$17,559,045 07	$46,519 89	$3,580,451 18	1,995
76,254 02	$12,498,361 16	$96,761 73	$3,436,848 44	1,638

* Includes 46 employed on the Corps for the Extension, Improvement and Filtration of the Water Supply.

ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE YEAR 1900

OFFICERS

OF THE

BUREAU OF WATER.

Chief,

F. L. HAND.

Assistants,

ALLEN J. FULLER, to May 31, H. J. JOHNSON, from December 1,
WILLIAM WHITBY.

Draughtsmen,

John E. Codman, John R. Gorman, F. C. Dunlap,
Martin Murphy, Jas. H. Hand, from April 7.

Chief Clerk—Job T. Hickman.
Assistant Clerk—Thomas Spence.
Correspondence Clerk—P. DeHaven.
Search Clerk—H. J. Johnson, to Nov. 30.
Assistant Search Clerk—Wm. J. Duffy.
Clerk—George G. Whitby
Assistant Clerk—K. McNeal
Assistant Clerk—J. J. Barney.
Time Clerk—W. J Innes.
Pipe Inspector—Theodore S. S. Baker.
Pipe Clerk—Chas H. Pyrah, from Feb. 10.
Messenger—Haines Lewis.

Telephone Operators,

Frances Shields, to June 3, 1900, deceased, Calvin Craner,
Jennie M. Hannings, June 25, 1900.

General Superintendent,

A. J. FULLER, from June 1.

Clerk to General Superintendent—John A. Hayes, to June 30, resigned
Assistant Clerk to General Superintendent—John B. Wright.

Works—General.

Foreman Machinist—Robert Bromiley.
Foreman Carpenter—Henry Guest.
Foreman Bricklayer—Frank A. Mooney, to Sept. 10, deceased.
Foreman Stonemason—Michael Farrell.
Foreman Rigger—James Forrest.
Foreman Painter—Joseph Work.
Foreman Laborer—William Calhoun.
General Storekeeper—S. C. Buchanan, to Aug. 11, dec'd
Electrician—Henry P. Morgan.
Superintendent of Shop—James H. Dean
Clerk to Superintendent of Shop—Morris P. Getz.
Lineman—D. McDougall.

Purveyors.

First District, John H. Holmes.
Clerk—William J. Mackey.
General Foreman—Thos. Preston.
Foreman of Repairs—W. W. Wellington.
Office, 1120 Wharton street

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

Third District, Charles J. Lowry.
Clerk—J. A. Spanagle.
General Foreman—Elias Abrams. *Foreman of Repairs*—Wm. R. Yetter.
Office, Beach street and Susquehanna avenue.

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

Fifth District, Henry Dawson, to March 31, resigned.
Charles Preston, from April 1.
Clerk—F J. Cornman.
General Foreman—Charles Frank, to May 31, resigned
Wm. H. Dawson, from June 14.
Office, 4377 Manayunk avenue.

Sixth District, George H. Laut, to Jan. 26, deceased
George W. Bardens, from March 14.
Clerk—Wm. D. Kinsler, to August 26, deceased.
General Foreman—Samuel Loeb.
Foreman of Repairs—James W. DeHart, to Nov. 26.
Office, Town Hall, Germantown.

ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE YEAR 1900.

FOURTEENTH ANNUAL REPORT

OF THE

BUREAU OF WATER.

NINETY-NINTH ANNUAL REPORT

OF

OPERATIONS CONNECTED WITH THE CITY WATER SUPPLY.

Philadelphia, February , 1901.

WILLIAM C. HADDOCK, ESQ.,
Director Department of Public Works.

DEAR SIR:—In submitting the report of the Bureau for the year 1900, it is exceedingly gratifying to be able to state that marked improvements have been made during the year in many branches of the service. Among these may be mentioned the following:

The completion of the new engine and boiler house at the Shawmont pumping station, the erection of four 5-million gallon pumps, two electric engines and generators for lighting the station, and the laying of an additional pumping main from the works to the reservoir.

At the Belmont pumping station, the old engine house has been torn down and a greatly enlarged structure (now under cover) has been erected in its place. An extension to the boiler house has also been made, and three new boilers have been erected in the new and one in the old sections of the building.

A new 5-million gallon pump has been installed at the Belmont high-service station, and one of a similar capacity at the Roxborough high-service station.

At the Queen Lane pumping station a new intake and pump wells have been constructed, two new electric generators and engines erected, and new pump chambers have been substituted for two of the old ones, which were cracked.

At the Spring Garden pumping station, six new pump chambers were substituted for a similar number which were also found to be cracked.

All of the above-mentioned improvements have greatly contributed to the betterment of the service and have materially lessened the strain under which the works named have, for some time past, been operated.

A new high-service station, which is now supplying Fox Chase with water, has been constructed at Wentz Farm, and several new pumping and supply mains have been laid, by means of which the pressures on the mains in West Philadelphia, Germantown, Manayunk and in the northeastern section of the city have been considerably increased.

The completion of the 48-inch supply main from the Wentz Farm reservoir, with 30-inch extensions to Lehigh avenue (about 90 per cent. of which is now finished) will further increase the supply in the northeastern section of the city, where, for a number of years past, it has been inadequate for domestic, sanitary, manufacturing and fire purposes.

Three new 10-million gallon engines are being erected on foundations prepared for them in the new engine house at Belmont pumping station.

All of these impovements, together with the services of two supply mains to be laid in the Fourteenth and Nineteenth Wards, will insure an abundant supply of water throughout the city during the coming summer season.

Improvements Under Construction and Proposed.

The works under construction during 1900 and now being carried forward to completion include the finishing of the flooring and interior walls of the new Belmont pumping station; the erection of two electric generators and engines; the installation of the three new 10-million gallon pumps above mentioned, and the completion of the 48-inch supply main from the Wentz Farm reservoir.

During the current year it is proposed to lay a 48-inch main in Thirty-second street, from a point above the Richmond Branch of the Reading Railroad to the Queen Lane reservoir, which will provide an additional outlet from this basin, intended to supply the Tioga district, and will complete the original plan for distributing mains from the Queen Lane reservoir.

Additional mains are to be laid under the provisions of the Loan for the "Extension and Filtration of the Water Supply," among which are the following, intended for the immediate improvement of the present supply.

Twelfth street, Girard avenue to Poplar street, 30-inch main.
Twelfth street, Poplar street to Spring Garden street, 20-inch main.
Broad street, Callowhill street to Vine street, 20-inch main.
Sixth street, York street to Susquehanna avenue, 30-inch main.
Susquehanna avenue, Sixth street to Fourth street, 30-inch main
Broad street, York street to Arch street, 48-inch main.

In my report for 1899 I referred to the appointment of a commission of experts, consisting of Messrs. Hering, Wilson and Gray, and to their report and recommendations relative to the "Improvement and Extension of the Philadelphia Water Supply." Since then a large corps of engineers and draftsmen have been engaged in making and perfecting detail plans for the construction of filters and basins, and the laying of large mains, etc., necessary and appurtenant to the improvement of the water supply—all of which will be fully reported upon by Mr. George S. Webster, Chief of the Bureau of Surveys.

My object in referring to the above is to call attention to the fact that, in connection with the improvement of the water supply, the experts have made provision for the laying of a number of large supply mains, which, to a very great extent, will take the places of those heretofore recommended to be laid by the Chief of this Bureau. The above list of mains, therefore, contains only those necessary for the "immediate improvement" of the supply. The great difference between it and those submitted with former recommendations will be fully accounted for in the list of mains recommended to be laid by the experts.

One of the most important improvements contemplated in connection with this Bureau is the installation of an independent high-pressure fire service system, intended, when completed, to cover a section of the city containing large and valuable properties.

The necessity for such a service is apparent, particularly in the vicinity of modern high structures, where much more powerful hose streams than now supplied are required for the extinguishment of fires.

Plans and specifications have been prepared for the con-

struction of such a service between Walnut and Race streets and the Delaware river and Broad street.

Eventually the system, as designed, will consist of a pumping station (to be located on the river front), provided with engines to pump directly into mains that are to be laid in all of the principal streets within the boundary named. Fire streams are to be taken directly from the fire hydrants, thus dispensing with the use of fire engines; and, where property owners desire it, connections will be made to these mains for their sprinklers or fire-hose systems.

Councils appropriated, under date of November 15, 1900, the sum of $300,000 for the construction of a fire-system in the locality named above, but, owing to the limited amount provided, the work to be undertaken at present will not include the erection of the proposed pumping station and fire pumps, and until these are constructed the fire boats now in service on the Delaware river will be utilized for forcing water directly from the river into the mains.

The fire mains will be constructed of cast iron flanged pipes; the branch connections, as well as all gate valves and fire-hydrants, are to be of semi-cast-steel. On the main lines and connections there will be 261 gate valves. The hydrant connections, of which there will be 166, will be of 7¼ inch internal diameter, and each hydrant will have two 4-inch outlets, controlled by independent valves.

Three fire-boat connections will be located at the river front, at Walnut, Arch and Race streets, each connection to have eight 4-inch nozzles for 4-inch hose connections.

All the pipes, hydrants, valves, castings, etc., for the fire service are to be tested at the manufacturers, and under a hydrostatic pressure of 800 pounds to the square inch. A further test, of 400 pounds to the square inch,

to determine the tightness of all the parts and joints, will be made after the laying and completion of the pipes, etc., in the trenches.

For a long time the roof of the old wheel house at the Fairmount station has been in a leaky condition, and although many attempts have been made to stop this leakage, even to the extent of putting an entire new outer covering on it several times, it was found to be impossible, owing either to the expansion and contraction of the iron beams, or to the vibration caused by the running of the turbine wheels, to prevent the percolation of water through the roof during, and for some time following, rainy weather. As a result, the engine room and pumps are now in a most deplorable condition.

Another important construction which should receive immediate attention is the building of a tower to protect as well as to conceal from view the conspicuous and unsightly standpipe located on the summit of George's Hill.

When permission to construct this standpipe was obtained from the Commissioners of Fairmount Park, it was granted only after a full understanding with the Commissioners that the pipe would eventually be enclosed in a substantial masonry structure of architectural merit, and subject to the approval of these gentlemen.

Some years ago plans were prepared for this work and bids advertised for, but the amount named by the lowest bidder was considered too high, and the contract therefor was not awarded. I am therefore having new plans prepared, with a view, if possible, of bringing the cost within reasonable limit. Upon completion of these plans they will be submitted to you for such action as you may deem proper in the premises.

I would also call your attention to the necessity for a general storehouse, to which all small stores, material,

etc., could be shipped, examined, and entered of record, and from which they could be disbursed with greater promptness and accuracy than is possible under the present conditions, which are as follows:

Part of these goods are sent to our storehouse at the Spring Garden pumping station, but a very large portion of them are delivered, by the contractors, at the various pumping stations and at the several Purveyor's District yards, and this arrangement renders it impossible, with our limited clerical force, to keep a proper check and account of the disposition of the goods received.

A storehouse of ample proportions should be erected in a central location, and for such purpose I would recommend the purchase of property adjoining the Second District office and yard, No. 918 Cherry street, on which (and including the premises now occupied by the Second District office, etc.) a warehouse and stable could be built suitable for the purposes and requirements of the Bureau.

The construction of a warehouse as above proposed would permit the use of the present storehouse at the Spring Garden station for a meter shop. Such a shop is absolutely necessary for the proper conduct of the meter business, every detail of which should receive prompt and careful attention. The necessary checking of this work cannot be accomplished with accuracy and despatch when it is performed under several heads and with the materials scattered in various parts of the city, as is now the case. It is also found that, even with the limited extent to which the use of water meters is permitted in this city, a shop conveniently located, for the repairing and storing of meters and the distribution of the work throughout the city, is absolutely necessary for the perfect and satisfactory management of this branch of the service

There has been an increase in the revenue from water rents, etc., of $125,241.04 over the amount collected in 1899.

The total collections during the year 1900 amounted to the following:

Water rents	$2,846,363 97
Meter rents	201,471 54
Frontage	143,953 21
Penalties	42,889 56
New connections	8,043 00
Miscellaneous	6,300 21
Searches	173 75
Total	$3,249,195 24

The following shows the increase and the decrease in the revenue as compared with similar collections for 1899:

	1899.		1900.	
	Decrease.	Increase.	Decrease.	Increase.
Water rents		$85,023 88		$71,820 24
Meter rents		24,455 93		38,751 75
Frontage	$47,439 48			12,681 15
Penalties		2,249 00	$1,944 89	
New connections	693 00			2,992 00
Miscellaneous	1,270 99			1,709 79
Searches	3,987 00		769 00	
	$53,440 47	$111,728 81	$2,713 89	$127,954 98
		53,440 47		2,713 89
Net increase		$58,288 34		$125,241 04

The expenditures for repairs, maintenance, service mains, etc., were	$1,574,704 95
The expenditures for improvements and extensions were	855,353 25
Total expenditures during 1900	$2,430,058 20
Revenue collected in excess of expenditures	$819,137 04

Decrease of Consumption.

The total consumption of water throughout the year was 104,823,485,000 gallons, or at the average rate of 287,187,630 gallons per day.

The per capita consumption was 221.9 gallons per day —an excess of 32.9 gallons over the per capita rate of 1899.

This apparently abnormal increase in the per capita rate is due to the fact that, with the exception of the years during which the U. S. Census is taken, it is necessary to estimate, or approximate, the population of the city, using the number of new dwellings, number of the city voters registered and the votes cast at city and state elections, to check the calculations. Notwithstanding the care exercised in doing this, the city's population has heretofore been greatly overestimated, and a correspondingly low per capita rate has resulted from such overestimation.

The above rate of 221.9 gallons per capita per day is obtained by dividing the average consumption of 287,187,630 gallons per day by 1,293,697, which is the U. S. Census estimate of the population of Philadelphia for the year 1900, and shows a rate greatly in excess of the requirements and far exceeding those for 1900 in the following-named cities:

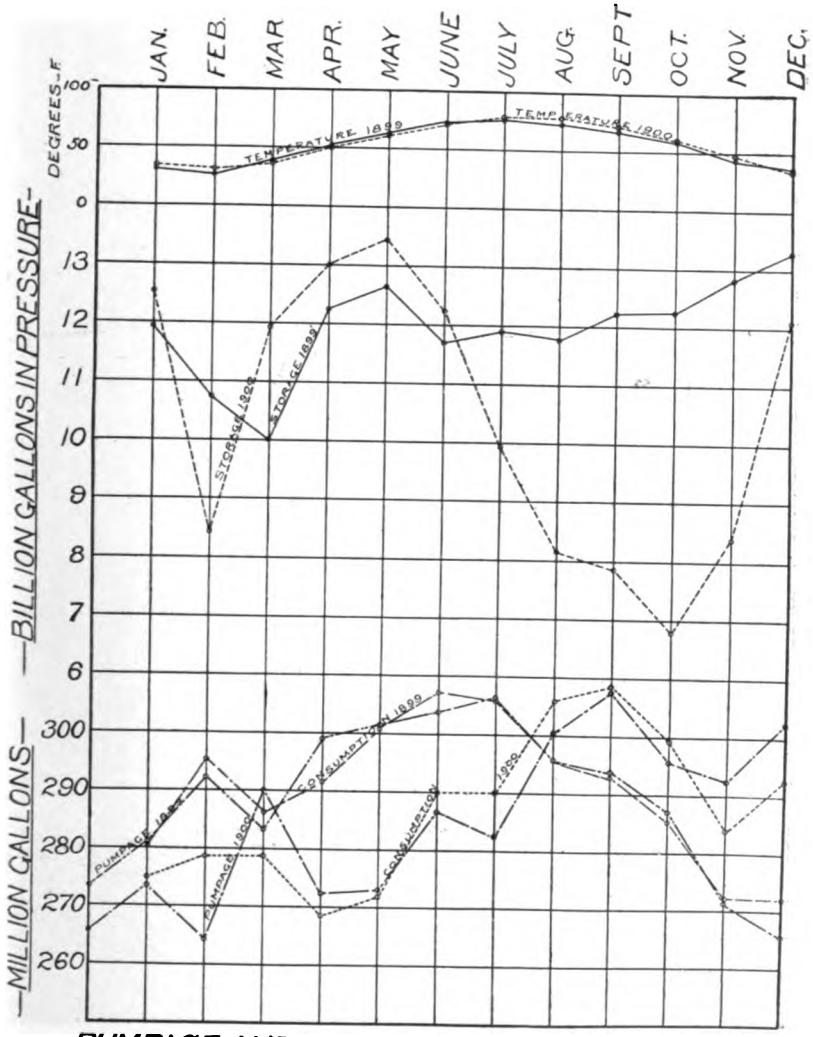
New York, per capita per day, 113 gallons.
Brooklyn, per capita per day, 84 gallons.
Providence, per capita per day, 54 gallons.
Baltimore, per capita per day, 108 gallons.
Washington, per capita per day, 183 gallons.
Chicago, per capita per day, 161.5 gallons.
Cincinnati, per capita per day, 115 gallons.

Notwithstanding the high per capita rate, it is quite gratifying to be able to state that during 1900, instead of having an increase of 15 or more million gallons per day, as had been our experience in many preceding years, the consumption, as compared with that of 1899, showed a decrease of 1,053,266,022 gallons, or at the rate of 2,885,660 gallons per day.

This decrease was due, to some extent, to improved pumping machinery which was put into service at the Roxborough station during the latter half of the year, but in a far greater degree to a material checking of the waste of water by the application of self-closing closet devices in place of what is known as the "Philadelphia hopper cock," and to the repairing of many leaky and wasteful water fixtures discovered by a corps of inspectors while making a house-to-house inspection for the purpose of revising the annual charges for water rents, and reported by them, for correction, to this office.

It was not the duty of these inspectors to make special examinations for leaks, and consequently it was only the visible leakage and waste in these houses which came under their notice and was reported by them. Were skilled workmen engaged for the purpose of thoroughly examining the plumbing of all premises, there would undoubtedly result a saving of water the cost of the pumpage of which would exceed the expense of the inspections.

The following diagram shows the average pumpage and consumption and the quantity of water stored in the



—PUMPAGE AND CONSUMPTION OF WATER—

—AVERAGE DAILY PER MONTH—

—1899–1900—

—PHILADELPHIA—

several reservoirs at the end of each month in 1899 as compared with the same data for the year 1900, from which it will be seen that there was a considerable increase in the pumpage and consumption during the latter half of 1900 over those for the same period in 1899. A reference to the temperature, however, shows that this was not only higher during the period of warm weather in 1900, but the heated term continued later in the season, and these facts account, in a great measure, for the increase in consumption during the time named.

The following tables show the pumpage—annual, maximum, average daily and daily per capita—as compared with that for the year 1899; also the cost of raising one million gallons one hundred feet high, as compared with that for 1899; the volume and cost of pumpage, etc., for the years 1890 to 1900, both inclusive, and the nominal, minimum and average daily pumpage for 1899 and 1900:

Comparison of Pumpage from the Delaware and Schuylkill Rivers for 1899 and 1900.

	Gallons.		Gallons.	
	1899.	1900.	Increase.	Decrease.
Annual pumpage:				
From rivers	105,876,751,022	104,704,533,711	.....	1,172,217,311
High service	2,114,620,582	2,118,042,344	3,421,762	
Total	107,991,371,604	106,822,576,055	.....	1,168,795,549
Maximum daily pumpage:				
From rivers	335,901,484	348,005,088	12,103,604	
High service	6,466,660	5,290,350	.....	1,176,310
Total	342,368,144	353,295,438	10,927,294	
Average daily pumpage:				
From rivers	290,073,290	286,861,736	.....	3,211,554
High service	5,793,481	5,802,855	9,374	
Total	295,866,771	292,664,591	.....	3,202,180
Average daily pumpage:				
From rivers, per capita	199.6	221.7	22.1	

Volume and Cost of Pumpage for the Years 1890 to 1900 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.
1890	51,698,508,099	84,501,451,686	$3 05	131	*1,046,000
1891	55,665,648,000	93,490,106,725	2 99	140	1,071,000
1892	59,787,584,178	102,443,373,631	2 68	143	†1,142,650
1893	65,352,736,978	110,590,708,479	3 22	150	1,190,493
1894	72,073,724,238	121,199,588,387	3 48	159	1,238,112
1895	78,775,849,104	132,040,954,195	3 69	162	1,329,957
1896	87,693,642,529	161,776,711,713	3 43	172	1,367,815
1897	95,667,466,871	187,371,927,277	3 16	185	1,385,734
1898	102,241,835,372	210,828,629,625	2 97	196	1,400,000
1899	107,991,371,604	231,813,686,728	2 90	199	1,425,843
1900	106,822,576,055	218,119,532,621	3 71	221	*1,293,697

* United States Census. † City Census.
‡ Including repumpage or high service.

Cost of Raising 1,000,000 Gallons 100 Feet during 1899 and 1900.

Pumping Stations.	1899.	1900.	Increase.	Decrease.
Fairmount	$1 31	$1 79	$0 48	
Spring Garden	2 89	3 36	47	
Belmont	3 25	5 03	1 78	
Queen Lane	2 11	2 75	64	
Roxborough	3 80	4 99	1 19	
Frankford	3 83	3 76		$0 07
Average.	$2 80	$3 58	$0 78	
High Service Stations:				
Belmont	26 00	32 51	6 51	
Roxborough	6 55	8 38	1 83	
Mt. Airy	13 92	18 88	4 96	
Chestnut Hill	78 52	82 33	3 81	
Frankford		23 27	23 27	
Average	$11 35	$14 94	$3 59	
Total average	$2 90	$3 71	$0 81	

Comparison of the Nominal, Maximum, Minimum and Average Daily Pumpage for 1900.

Pumping Stations.	Nominal.		Maximum.		Minimum.		Average.	
	1899.	1900.	1899.	1900.	1899.	1900.	1899.	1900.
Fairmount	33,290 000	33,290,000	41,284,221	39,567,619	2,131,820	695,649	23,612,697	15,689,000
Spring Garden	170,000,000	170,000,000	156,694,520	168,760,140	79,982,640	32,796,880	126,632,562	136,556,359
Belmont	38,000,000	38,000,000	40,828,320	41,168,400	23,686,995	25,323,956	31,352,537	32,586,051
Queen Lane	80,000,000	80,000,000	81,030,050	82,248,350	27,621,350	7,232,000	70,354,933	62,855,141
Roxborough	31,000,000	51,000,000	25,167,623	25,118,525	15,879,570	1,961,300	21,692,527	20,071,096
Totals from Schuylkill	352,290,000	372,290,000	345,004,734	356,863,034	149,302,375	68,009,785	273,645,256	267,757,647
Increase		20,000,000		11,858,300				
Decrease						81,292,590		5,887,609
Frankford	42,000,000	42,000,000	24,727,152	30,270,430	6,784,100	9,911,225	16,428,084	19,104,077
Total from Delaware	42,000,000	42,000,000	24,727,152	30,270,430	6,784,100	9,911,225	16,428,084	19,104,077
Increase				5,543,278		3,127,125		2,676,043
Decrease								
Totals from Delaware and Schuylkill	394,290,000	414,290,000	369,731,886	387,133,464	156,086,475	77,921,010	290,073,290	286,861,724
Increase		20,000,000		17,401,578				
Decrease						78,165,465		3,211,566

Comparison of the Nominal, Maximum, Minimum and Average Daily Pumpage for 1900—Continued

High Service Stations.	Nominal.		Maximum.		Minimum.		Average.	
	1899.	1900.	1899.	1900.	1899.	1900.	1899.	1900.
Belmont	2,500,000	7,000,000	1,105,380	1,374,545	264,333	480,600	643,771	704,986
Roxborough	5,000,000	10,000,000	5,203,440	4,508,460	1,407,780	1,132,080	3,976,027	3,716,866
Mt. Airy	3,000,000	3,000,000	2,088,750	1,485,000	90,000	1,091,250	1,078,033	1,126,663
Chestnut Hill	750,000	750,000	865,920	501,840	62,400	78,720	95,650	89,056
Frankford	.....	3,000,000	.....	3,362,614	.....	74,655	.....	494,492
Total High Service	11,250,000	23,750,000	9,263,490	11,232,459	1,824,513	2,857,305	5,793,481	6,132,063
Total daily	405,540,000	438,040,000	378,995,376	398,365,923	157,910,988	80,778,315	295,866,771	292,993,787
Increase	.....	32,500,000	.....	19,370,547				
Decrease	.....	.....	.....	.....	.....	77,132,673	.....	2,872,984

Cost of Pumpage.

There has been an increase in the cost of pumpage, amounting to 81 cents per million gallons pumped 100 feet high, as compared with that of 1899. This increase in cost is wholly due to the employment of additional force required on new pumps and boilers, and to various items of expense not heretofore included in the cost of operating the works.

Other items of expense justly chargeable to the cost of pumpage include the increased cost of fuel, oil, lighting, and the more extensive repairs to machinery than usually made. All of these are fully shown in the following table, and the table of current expenses accompanying this report:

Items of Expense not Heretofore Charged to Cost of Pumpage.

Wages of per diem men permanently employed at station.	$36,839 92	
Salaries and wages of new engineers, firemen and substitutes	9,478 33	
		$46,318 25
*9,321 tons increase of coal consumed and at an average increase of 15 cents per ton in price	$49,887 73	
		49,887 73
Increase in price of oil	$2,017 37	
Increase in consumption of grease	958 60	
		2,975 97
Increase in cost of lighting	559 08	
		559 08
New pump chambers at Spring Garden Station	$11,020 00	
New pump chambers at Queen Lane Station	3,941 40	
New pump chambers at Roxborough Station	3,746 50	
Material and cost of labor furnished by City shop to stations	16,673 38	
Increase in expenses to repairs on engines and boilers	2,516 70	
		37,897 98
Total increase		$137,639 01
Decrease in small stores		87 01
Actual increase		$137,552 00

* The increased consumption of coal was due to the poor quality of that received during the miners' strike and to increased steam pumpage at the Spring Garden Works to make up the deficiency of pumpage by water power at the Fairmount Station where the quantity of water pumped during 1900 was less than in any year since 1863.

House-to-House Inspections.

Pursuant to your instructions of April last, and upon the appointment of an additional force for the work, I instructed our Mr. Harshaw, Chief Inspector, to begin an inspection of all premises in order to ascertain the correct amounts to be charged against them for water rents.

The sixteen men first appointed by you for this work were sent, under the supervision of inspectors of experience, to make inspections of the properties in the Twenty-second Ward. Long before this was completed the necessity for increasing the force of inspectors became apparent, and, on May 23d, twelve additional men were appointed, and others were added to the list from time to time. The force now consists of thirty-one inspectors and ten clerks in the office—the latter engaged in checking and entering of record the inspectors' reports.

Complete returns have been received from twenty-four wards, and these show a total of 121,524 properties inspected, of which 20,554 were delinquent for water rents amounting to $74,500.75.

In four other wards 379 mill properties were inspected, of which 167 were delinquent for charges amounting to $11,102.50.

These bring the total of delinquencies so far discovered to $85,603.25, the greater part of which should have been charged on our books and collected as part of the revenue of this Bureau for several years past.

The average amount of delinquency for each ward (mills only inspected in the Nineteenth, Twenty-fifth, Thirty-first and Thirty-third wards, was	$3,057 25
For each property delinquent	4 16
For each property inspected	70
The total cost of the inspections, including the extra clerical force at the main office, was	$14,808 38
Showing receipts amounting to	70,794 87

in excess of the cost of the inspections.

The following is a statement of the operations and conditions of the pumping stations and reservoirs:

Fairmount Station.

Owing to the drought of the past summer, which extended unusually late into the season, there was a decrease of 33.6 per cent. in the total pumpage at this station as compared with that of 1899, and for the last seven months of 1899 and 1900 the average pumpage per month was, 506.4 million gallons, respectively, as against 211.8 million gallons. This decrease of supply by water power had to be made good by steam pumpage at the Spring Garden station, which partly accounts for the increased average cost of pumpage for 1900 throughout the city.

These works, with the exception of some needed painting and plastering, are in as good condition as can be expected with a leaky roof over them.

During the dry season there was an unusual number of days when water did not flow over Fairmount dam, and advantage was taken of these opportunities to make a few absolutely necessary repairs to the cribbing in front of the dam. In all, 133 new timbers, 10″ x 10″ x 16′ long were subsituted for old and decayed pieces. This was as far as the means at our command would permit us to go, and the limited extent of these repairs only serves to emphasize my oft-repeated recommendation that sufficient money be appropriated for the thorough overhauling of this structure, upon which depends three-fourths of the city's water supply.

Spring Garden Station.

All the engines at the Spring Garden station have been worked to their full capacity, and at times it was necessary to keep them in operation when due consideration

for the proper care of such machinery required that the pumps should be shut down for repairs.

The inevitable result of operating machinery under these conditions is a larger bill for repairs than would otherwise be necessary.

At the lower house, six new pump chambers were substituted for a similar number of broken castings in Nos. 2 and 3 engines. The materials were furnished and the labor performed by the Holly Manufacturing Company, of Lockport, N. Y. The work was completed and No. 3 engine started up on February 1, and No. 2 engine on May 6, 1900, since which dates there has been no trouble with either of the pumps from this source. There has, however, been considerable difficulty experienced by reason of the frequent breaking of the air-pump rods, and, finding no relief from the repairs and efforts made to remedy the faulty construction of the device for operating the air pumps, it was decided to remove the latter and substitute therefor two 14-inch "Schute" condensers. These are now being installed, and while the engines are out of service advantage is being taken of such opportunity to make all other repairs necessary to these engines, including those to the foundations—under the high pressure and intermediate pumps—which have been a serious source of trouble throughout the past summer.

Nos. 9 and 10 engines, with slight repairs, have been maintained in excellent condition.

At the upper house, the conditions are not so favorable. No. 5 engine worked uninterreptedly until the middle of December, when it was shut down for temporary repairs, but later it will require a thorough overhauling.

No. 6 engine has been in good condition and ready for use at all times, but the chief difficulty experienced in

operating this pump is lack of steam when all the other pumps are running.

No. 7 engine has been in constant use, but it requires a thorough overhauling and repacking of one of the pump chamber joints, and to do this the engine will have to be put out of service for several weeks.

No. 11 engine is in a condition similar to that of No. 7, and owing to its construction it will be necessary to dismantle the greater part of one-half of it in order to make the repairs.

All the boilers at these works are in good condition, and have been recently inspected by the Bureau of Steam Engine and Boiler Inspections.

Belmont Station.

On June 30, 1900, a contract was executed with Mr. George C. Dietrich for the construction of a new engine house and intake at the Belmont works, and for an extension to the old boiler house.

Under the conditions of the contract Mr. Dietrich was required, first, to construct a frame building inside of the old structure over engines Nos. 1, 2 and 3, then remove the old building to the foundations and after extending the latter on the south, to provide room for three additional pumps, to erect a new building, 166′ 10″ long and 73′ 6″ wide, thereon.

The work of demolishing the old engine house was begun on June 15, 1900, but owing to the inadequate force employed by the contractor, slow progress was made, and it was not until August 10th that the masons commenced building the foundations and under-pinning the boiler-house wall. All foundations were completed November 24. The Hummelstown brownstone base was begun November 10 and completed December 4. The

exterior walls were started November 24th and, including all terra-cotta work, were nearly finished at the end of the year.

The erection of the steel columns and roof system were started November 3d and completed November 26th, and at the present writing the building is under roof.

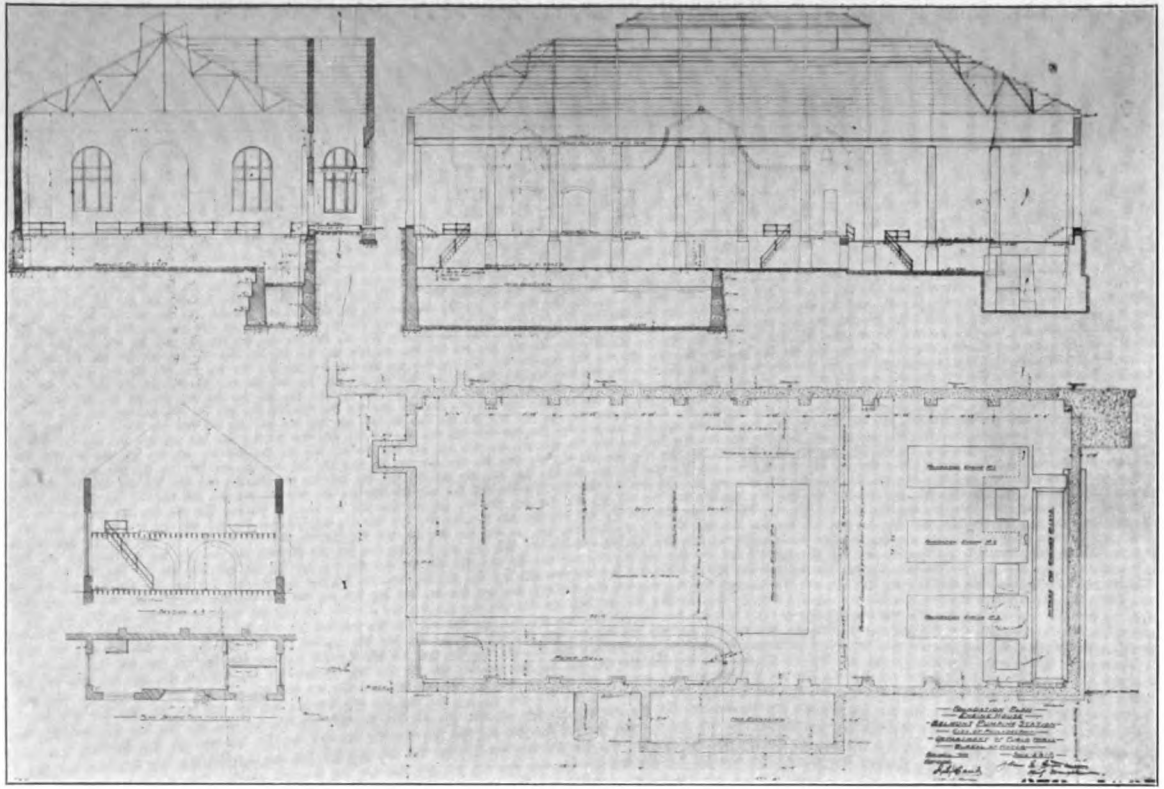
The work which yet remains to be done includes the lining of the interior walls with enameled brick; the erection of an electric traveling crane; engine and generators for electric lighting; hardware on doors and windows; pointing walls; terra-cotta work, and finishing the intake from the river to the pump well, the greater part of which is nearing completion.

The construction of the extension to the boiler house was finished December 3, 1900, and three new boilers placed therein, and one in the old structure. These boilers were manufactured by Messrs. Robert Wetherill & Co., of Chester, Pa., and are of the furnace flue tubular type, internally fired, and eight feet six inches in diameter and twenty feet long.

The three new pumps now being erected by the Holly Manufacturing Co., of Lockport, N. Y., in the new building south of the old pumps, are of the high-duty rotative type, of 10 million gallons capacity, with superimposed high and low pressure cylinders, of 20 and 50 inches diameter, respectively; length of stroke, 3.17 feet, and diameter of pump plungers 22½ inches. The piston speed is limited to 200 feet per minute, and the revolutions to 30 per minute.

These pumps are to discharge through two lines of 36-inch pumping mains, 9,000 feet long, against a static head of 290 feet.

This addition of 30 million gallons pumping capacity to the existing facilities of the Belmont works will pro-



NEW ENGINE HOUSE, BELMONT STATION.

vide adequate means for supplying West Philadelphia with water for a number of years to come, and inasmuch as the new pumps will be vastly more economical in the consumption of steam, there will be a corresponding saving of coal and increase in efficiency in all other branches of the service pertaining to this station, not the least of which will be a reserve boiler and pumping capacity, the entire lack of which, for many years past, has been a source of extreme anxiety which only those in charge of a water works system, and under such conditions, can fully realize.

The old pumps were operated at great disadvantage during the work of constructing the new buildings. The enclosures under the temporary frame structures were extremely hot in summer and cold in winter, and the dust arising from the demolishing of the old walls, etc., was exceedingly annoying.

The supply in the reservoir, however, was maintained at high water level, to a much more satisfactory extent than has been the case for a number of years past, and notwithstanding that, during 1900, there was, in West Philadelphia, an average increase in the consumption of 1.23 million gallons per day.

The average daily pumpage at these works, as shown by the pump registers, was 32.59 million gallons, or 218 gallons per capita per day, while the Venturi meters showed only 27.03 million gallons per day, or a per capita rate of 180 gallons per day—a difference of about 20 per cent.

I believe the quantity registered by the meters is as accurate as it is possible to measure the discharge from large mains, and the deficiency of 20 per cent. in the quantity of water pumped represents the inefficiency of the old-style pumps and their need of repairs.

The boilers at this station are in good condition. On January 30 to February 9, boilers Nos. 6 to 11, inclusive, were reset, and Nos. 1, 4, 5 and 9 were repaired.

All the trestle work for supporting the tracks in the coal shed was rebuilt, and new bumpers were placed on two of the tracks. A new bumper should be provided for the third track.

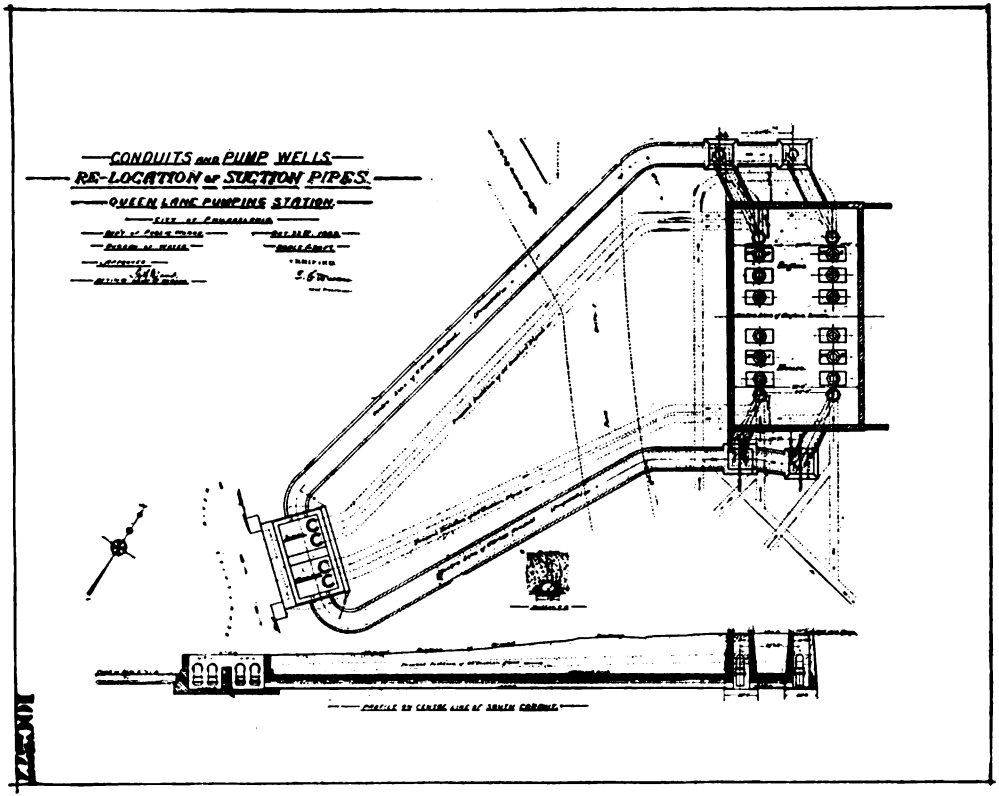
Queen Lane Station.

The pumps at Queen Lane station have been operated, throughout the greater part of the year, under very unsatisfactory conditions. Not only have the suction pipes continued to leak and to make it troublesome to run the pumps, but there has been an unusually large number of broken stops, mains, pedestal bolts and fixtures, which, even for this station, already possessed an unenviable record for annoying and serious mishaps.

Most of the accidents which have occurred at the Queen Lane station were supposed to be due to air passing through the leaky joints of the suction pipes and accumulating in the pumps and in the discharge mains, causing ram and a surging of the water with such energy and force as to be highly destructive to works of ordinarily good construction.

The suction mains are laid with pipes of the ordinary bell and spigot ends and lead joints. There are four lines of these mains, 48 inches in diameter and about 300 feet long, extending from the river to the engine house, and the lift is 17 feet. As will be seen, these are exceedingly trying conditions for the operation of large pumps.

To remedy this difficulty a contract was made for the construction of conduits from the intake at the river front to the north and south ends of the pumping station, at sufficient depth for the water to flow into wells, from



New Conduit and Pump Wells, Queen Lane Station.

which each pump can lift the water through short suction pipes of cast iron with flanged joints.

Messrs. Harmer & Quinn, the contractors for this work, completed the north conduit on November 1st and water was turned in at 10.05 A. M.

The depth of water in No. 3 pump well was 10 feet when No. 4 engine was started, which decreased to 9 feet 9 inches, but no additional fall occurred, even when No. 3 engine was started.

At the intake on the river front the surface of the water fell $\frac{1}{2}$ inch after the starting of No. 4 engine, and an additional $1\frac{3}{4}$ inch after the starting of No. 3 engine.

There was a marked improvement in the running of both engines, as shown by the steady movement of the working parts, decreased vibration of the pumps, and greater discharge shown at the overflow at the reservoir.

The conduit from Nos. 1 and 2 engines was completed on November 22d. Water was let in and No. 2 engine was started at 5 P. M.

The boilers at Queen Lane station are in a fair condition, but the tubes at the back ends are beginning to give out. As fast as necessary these are being removed, and, after being "safe ended" are replaced. While this work is being done advantage is taken of the opportunity offered to thoroughly clean the boilers, and to repair all other parts which may be found to require attention.

This station is still without proper facilities for the storing of coal, which has to be hauled from the Wissahickon Station. The cost of hauling coal to the station, during 1900, was $9,977.25, and the total expenditure for this purpose since 1896 is $41,668.46.

Roxborough Station.

At Roxborough station the improvements mentioned in my report for 1899 have been completed and there is now ample engine and boiler power to supply the Twenty-first and Twenty-second Wards with water for some time to come.

The purchase of the property of the Knickerbocker Ice Co., south of the pumping station, will provide ample room for the storage of coal and plans for the construction of a building for this purpose are now being prepared.

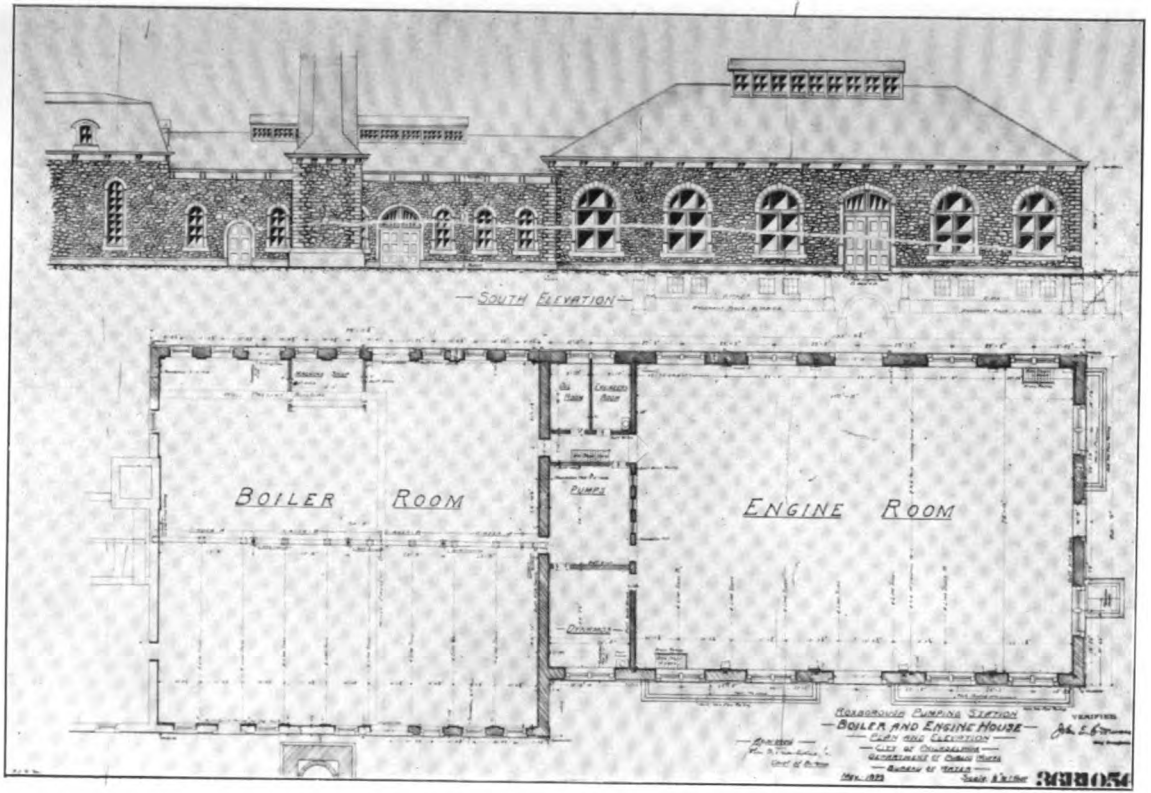
The new engine and boiler houses were completed in October.

Two new boilers were installed by the Robert Wetherill Co. on April 30th, and on September 12th, the first of the four new Worthington engines (No. 6), was started; the second engine (No. 4) was started on September 20th and the third (No. 7), on November 27th. The fourth engine (No. 5), is in place but necessarily has not received the same attention as the others.

These four engines are all of the same size and pattern and of 5 million gallons capacity. The high and low pressure cylinders are arranged tandem and are 18 and 50 inches in diameter, pump plungers are 17 inches in diameter, stroke 3 feet, revolutions 26 and piston speed 156 feet per minute.

Since the starting of the first of these pumps on September 12th, from one to three of them have been in constant service and there has been no difficulty in keeping the water in both the old and new basins up to or within a few feet of high water mark.

Another satisfactory feature of the new pumps is the saving of 24 per cent. of coal since they were started, as compared with a corresponding period of the previous year.



New Roxborough Engine and Boiler House.

The use of the new pumps enabled us to shut down Nos. 1 and 2.

No. 1 pump had been operated under such unfavorable conditions that it had worked the foundations loose, cracked the bedplate and high and low pressure cylinder heads and was otherwise in a somewhat damaged condition.

Under these circumstances and in view of the fact that the four new 5-million pumps, with the old pumps Nos. 2 and 3, amply provide for the present requirements, it was decided, with your permission, to remove No. 1 pump and repair and re-erect it at the Frankford station.

The work was accordingly advertised and a contract was made with the Southwark Foundry and Machine Co., who were the lowest bidders, and who are now dismantling the pump and expect to have it repaired and re-erected at Frankford by July 1st next.

In the meantime a new pump chamber is being substituted for a cracked one on No. 2 pump and a new diaphragm is being placed in the remaining old chamber. The steam valves have been put in good condition and other repairs are being made, all of which will increase the efficiency of this pump at least 50 per cent.

After this work is completed two new pump chambers will be substituted for the old ones on No. 3 pump and this engine will likewise receive a thorough overhauling, which I have every reason to believe will also result in 50 per cent. more of efficient service.

For the present it is proposed to allow the 4-million gallon Worthington pump, which was purchased in the latter part of 1898, when No. 1 engine broke down, to remain in position, but the d'Auria pump, after doing good service under very trying conditions, has been re-

moved to the Frankford High Service station where it is now being re-erected, with enlarged pump chambers and plungers, which will increase the capacity of the pump from 2½ to 4 million gallons per day.

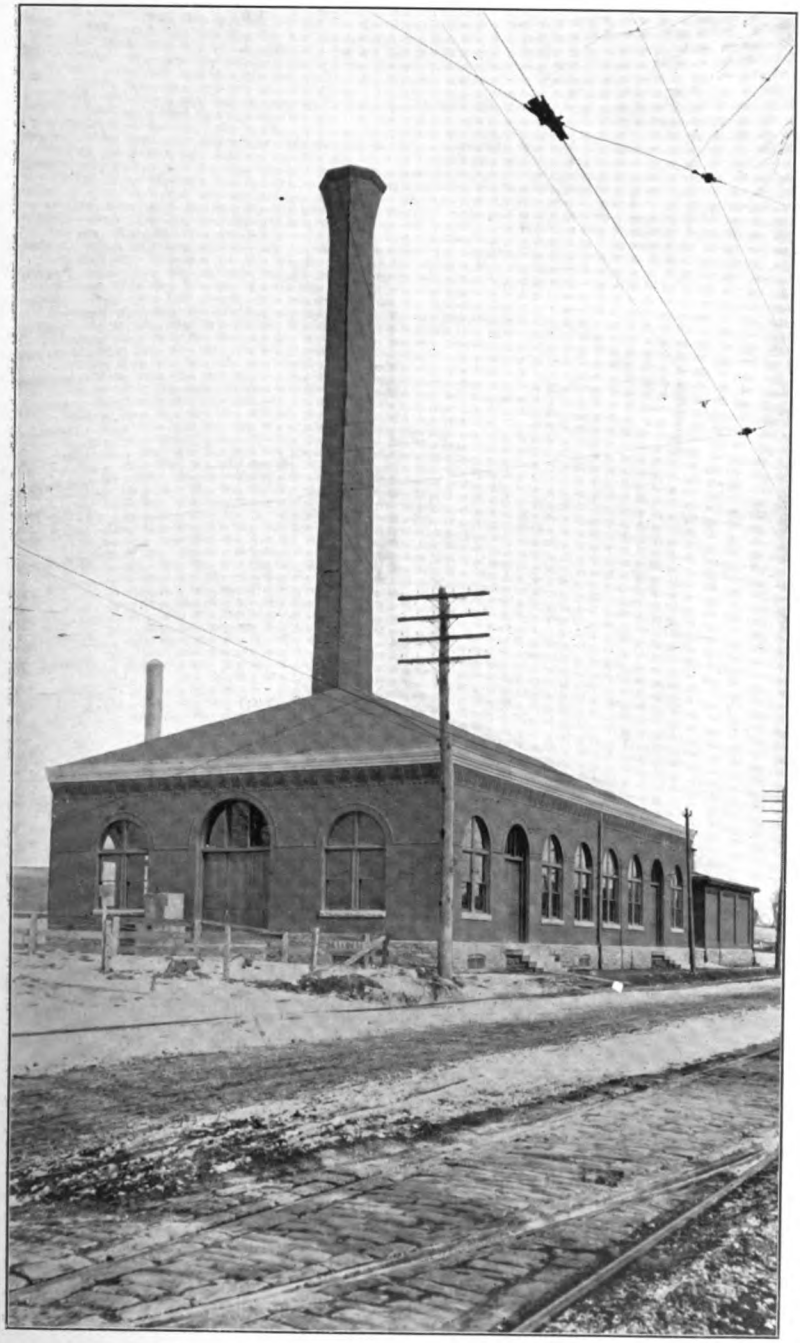
The boilers at the Roxborough station are in good condition.

Upon the completion of the grading around the engine house, the river wall and the embankment wall next to the railroad and the construction of a building for storing and apparatus for handling coal, this station will be in a very satisfactory condition.

As already stated, arrangements have been made for the removal of No. 1 pump from Roxborough to the Frankford station, and on October 19th preparations were commenced for the construction of the foundations for it.

When the Frankford Pumping Station was enlarged, in 1894, to provide room for No. 3 engine, the building was made large enough for the accommodation of two engines, and it is in the space so provided and on subfoundations of piling and concrete then constructed, that it is proposed to place the engine from Roxborough.

It was found, however, that the foundations as originally constructed did not cover the whole space within the three walls of the building and the wooden intake or conduit which formed the fourth side of the space reserved for another engine and that water entered so freely into the space between the foundation and the conduit that a 6, an 8 and a 10-inch pump, used together, could not keep it out except at low tide. Sheet piling was, therefore, driven wherever it could be done with advantage, but as water continued to enter with almost equal volume through the bottom, an extra row of heavy piling was driven along the side of the conduit and capped with two lines of 10 x 10 timber, and concrete was



FRANKFORD HIGH SERVICE PUMPING STATION.

then placed in prepared isolated places until the whole area was covered and all leaks were closed. The work of building the sub-foundations has since been continued and they are now of the required height and ready for the foundation bolts. I see no reason why this engine should not be ready for service early in the summer.

The boilers at this station are in excellent condition and all other parts of the work are in good repair.

High Service Stations.

The condition of the Chestnut Hill and of the Mt. Airy High Service stations remains practically as stated in my report of last year. The first-named station is used but little and is, in fact, maintained only for service in case of an emergency. At Mt. Airy the usual quantity of water was pumped and the works have been maintained in a fairly good condition.

Important improvements were made at both the Belmont and Roxborough High Service stations by the installation of a 5-million gallon pump at each place. These pumps were made by the Henry R. Worthington Co. and are of their well-known type of horizontal compound high duty pumping engines, with tandem high and low pressure cylinders, 13 inch and 36 diameter, pump plungers 17 inches in diameter, stroke 3 feet, revolutions 26 per miuute and piston speed 156 per minute.

The new pumps have been in service more or less for the past three or four months but have not, as yet, been subjected to any test except as to capacity, the requirements for which they readily fulfill. These two pumps now being in service it will be possible to shut down the old ones which have been in service for many years and are in urgent need of repairs.

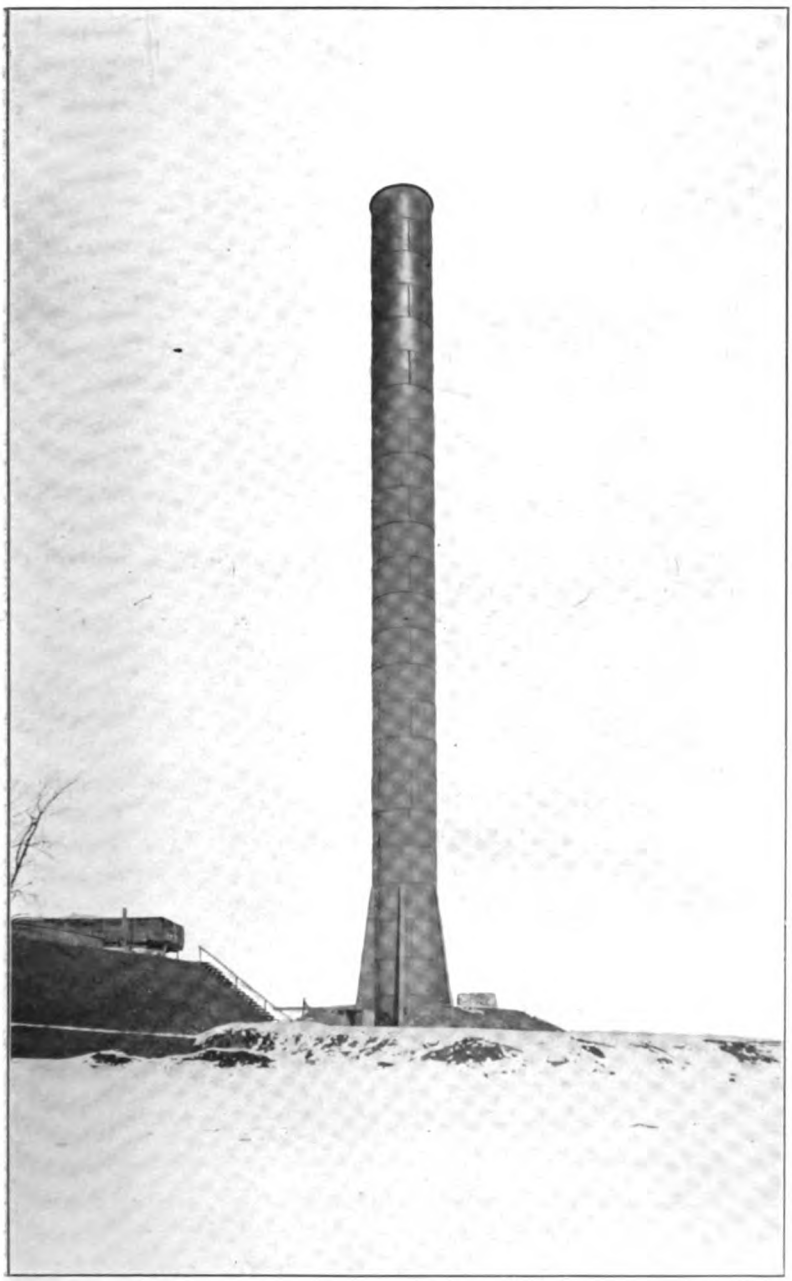
The work of constructing the Frankford High Service

pumping system for the supply of Lawndale, Fox Chase and intervening territory was commenced during the latter part of 1899 and was completed in the Fall of 1900.

In giving a rough outline of this system I would say that it consists of a pumping station, located at Old Second and Comly streets, within a short distance of the Wentz Farm reservoir, from which the water is conveyed through a 20-inch main to the engine house and from thence is pumped to points of delivery, under a head of 166 feet, through 7,980 feet of 20-inch and 5,071 feet of 16-inch mains. At a point about 600 feet above the pumping station a 20-inch relief pipe extends from the main in Second street to a stand pipe located at the northeast corner of the reservoir. This stand pipe is 11 feet in internal diameter, 150 feet high, and is provided with 12-inch overflow pipe discharging into the reservoir. The boiler and engine house and stack were constructed by Mr. Harry Kuemmerle. There was considerable delay in commencing the construction of these buildings and cold weather having set in the masonry was injured by frost to such an extent that much of it had to be rebuilt and re-pointed and part of the stack had to be torn down and rebuilt.

Three boilers, of the furnace flue type, were constructed by the I. P. Morris Co. of Philadelphia and were tested by the Steam Engine and Boiler Inspectors on September 21, 1900.

A 3-million gallon pump, manufactured by the Holly Manufacturing Co., of Lockport, N. Y., was placed in position and started on October 13, 1900. This engine is of the rotative type, with superimposed cylinders. H. P. cylinders 12 inches in diameter, L. P. cylinders 32 inches in diameter, pump plungers 13¾ inches in diameter, stroke 2 feet, revolutions 35, and piston speed, 140 feet per minute.



FRANKFORD HIGH SERVICE STAND-PIPE.

This engine was subjected to a durability test on November 27th, with perfectly satisfactory results.

The foundations have been prepared for the d'Auria 4-million gallon pump which will be placed in position at as early a date as possible.

Reservoirs.

The embankments, lining and fencing of all the reservoirs, with the exception of the lining of the Queen Lane reservoir, have all had more or less repairs made to them, and they are now in a fairly creditable condition.

A serious leak occurred at the north stop house of the Queen Lane reservoir on March 18th, the water appearing at the joints of the masonry in the passage-way between the stop house and the street, but close to the stop house. The floor of the passage-way was coated to a considerable extent with yellow clay which had washed through the masonry, and from all appearances it seemed as if the leakage came through the reservoir bank. It was found, however, that instead of this being the case, it came from two leaky joints of one of the outlet mains. The water was drawn off from this pipe and the joints were repaired from the inside on April 4th, since which time there has been no further trouble.

On May 10th a leak was reported at the Mt. Airy reservoir, which showed on the southeast side, about 9 feet above the bottom of the basin. It was found to extend through the reservoir bank and no explanation could be given for its appearance. On May 19th repairs were made by excavating the embankment and replacing and ramming the material back into place. The brick lining was then restored and no leakage has since occurred.

There was a leak of a very serious nature at the East Park reservoir, the first indications of which appeared

about 8 feet east of the foot of the reservoir embankment and a little north of the Norris street stop house. The leak was first brought to my notice on April 7th, when it showed simply as a wet spot on the ground. It was carefully watched for some time and no change was observed until July when it appeared to have slightly increased. On the 19th of July I ordered an excavation made, which by the 22d had reached a depth of 5 feet. Water appeared to rise from about the centre of the pit, flowing in a constant and good-sized stream, indications pointing to the reservoir as the source. On the 24th the leak still appeared at the bottom of the excavation, but about 2 feet nearer the reservoir. It was then considered best not to run any further risk and preparations were immediately made to draw off the water from the north-east section of the basin. By the 26th the depth of water in the basin was reduced to 12 feet 3 inches and it was observed that considerable less water was flowing into the pit. During all this time careful examinations were made inside the basin, and on the above mentioned date water was discovered flowing through a crevice of the brick lining at a point 1 foot below the surface of the water and about 6 inches west and 16 inches north of north wall of the Norris street stop house. Late in the evening, when the water had been drawn below this point, coal oil was poured into the opening and 6 minutes later it appeared in the pit, showing that the leakage came through the embankment. As the water was drawn down in the reservoir, the inside brick and cement lining were removed from the point where the water passed through, following downward towards the bottom of the reservoir a small but clearly-defined passage-way in the clay lining and just beneath the 2-inch layer of cement covering. This water passage took at several stages a

nearly vertical drop of 6 or 8 inches and when within a few feet of the bottom of the reservoir, branched in two directions, both of which were followed to a point at the foot of the inside slope, at which place the brick lining was intact, but the 2-inch cement covering over the clay was perforated by an oval hole, the longest and shortest dimensions of which were about 5 and 10 inches. The ends of the hole were rounded from the outer surface to the inside and were rough as though they had been scraped with a pointed instrument. Up to this time all progress was made by working towards the basin, but from the discovery of the hole in the cement lining, the direction of the passage was reversed, or, in other words, it now took a course towards the outside of the reservoir, but on a descending grade. The hole was full of slush and lumps of hard clay. The passage was followed by excavating into the reservoir bank, and on the 11th of August a point 3 feet below the bottom of the reservoir was reached. The passage then extended horizontally to near the stop house when it took a northern course of 18 inches and then east again towards the pit. Water poured into the pit outside the reservoir, appeared on the inside, at the point excavated.

After doing considerable excavation, with a view to getting a clear opening to the outside entrance, which was 8 or 9 inches in diameter and finding that it would be necessary to cut much deeper into the embankment than was deemed safe, I ordered pipes to be placed over the inside and outside openings and the holes to be filled to the fullest extent with thin grouting, after which the excavated materials were replaced and the lining restored, which work was completed on October 6th. The water was turned into the basin, which has since been filled to

and above the high-water level, but no sign of leakage has since appeared.

In my opinion all the trouble and danger in this case was caused by craw-fish, several of which, of large size, were found during the uncovering of the water channel to the bottom of the reservoir.

Distribution.

The water supply throughout the several distribution systems has been as satisfactory as the existing means of supply would permit.

The principal localities from which complaints of insufficient supply were received were in the old city proper —between the Delaware and the Schuylkill rivers and between South and Vine streets—and the northeastern section of the city, including the Thirteenth and Fourteenth Wards, and north of Lehigh avenue and east of Sixth street. These sections will be adequately supplied upon the completion of the 48-inch main from Wentz Farm reservoir and several 30-inch mains provided for under the $12,000,000 loan.

It is expected to have this important work finished early during the current year, and after its completion I feel confident that there will be no reason for complaint of insufficiency of water in these sections of the city for several years to come.

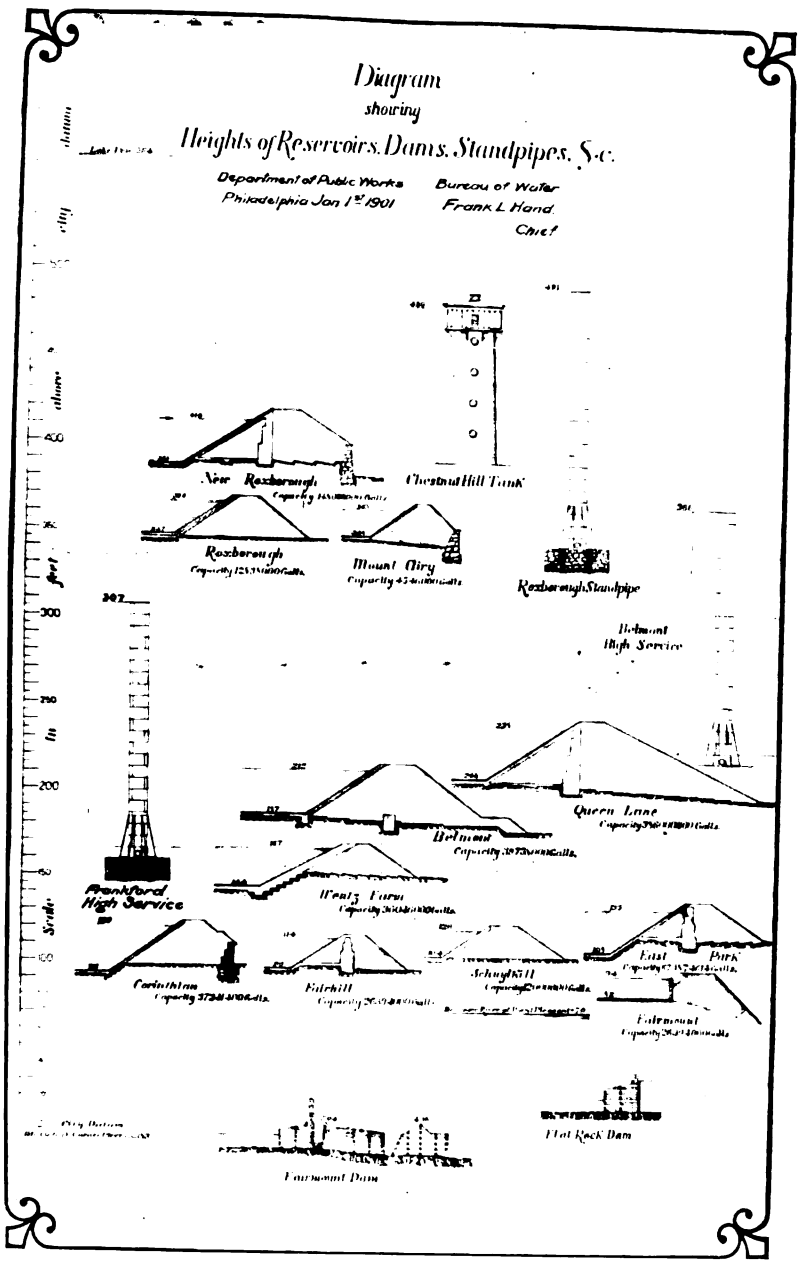
Upon completion of the 30-inch supply main from George's Hill reservoir to Thirty-eighth street and Lancaster avenue and a 20-inch main from the latter point to Woodland avenue, the pressures in West Philadelphia were nearly doubled, and the water supply is now ample throughout this locality.

The considerable decrease in the number of building operations has caused a corresponding decrease in the demands

Diagram
showing
Heights of Reservoirs, Dams, Standpipes, &c.

Department of Public Works
Philadelphia Jan 1st 1901

Bureau of Water
Frank L. Hand
Chief



for service mains. The quantity of water pipe laid during 1900 is, in consequence, considerably reduced. All work of this description and repairs to the distribution system have received prompt attention.

Meters.

The conduct of this branch of the service was unsatisfactory. A thorough examination of all water meters was ordered, and this has resulted in the discovery of quite a number in an unserviceable condition. These have since been repaired, and changes in the locations, sizes and styles of meters have been made, greatly adding to the betterment of this branch of the service.

The applications for meters by water consumers is greater than we are able to supply with our limited appropriation, and I would urge an increase of this item sufficient to meet the demands of all applicants for meters. These are principally manufacturers and other large consumers of water.

A 20-inch and a 30-inch Venturi meter, also a 36-inch Ferris meter, have been purchased, to be placed on the old 20-inch and 30-inch and the new 36-inch pumping mains at Roxborough.

A 48-inch Venturi and one of a similar size of the Ferris type of meter have been purchased for the two 48-inch pumping mains at Queen Lane station.

A 36-inch Ferris meter has been delivered at the Belmont station, to be placed on the pumping main to be provided for the new Holly 10-million gallon pumps, and a 30-inch Venturi meter has also been provided for the 30-inch main at the Frankford station.

At the earliest opportunity these meters will be placed on the lines of their respective mains, and we shall then be able to determine the quantities pumped from the rivers

at all our stations, except at Spring Garden and Fairmount stations, which should be likewise equipped with these, or similar means, for measuring the quantities of water pumped.

Respectfully submitted,

F. L. HAND,

Chief of Bureau.

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, February 19, 1901.

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

DEAR SIR:—I have the honor to transmit, herewith, tables showing the receipts, estimates, amounts rendered available, etc., and the detailed expenditures of the Bureau for the year 1900.

Yours respectfully,
J. T. HICKMAN,
Chief Clerk.

List of Miscellaneous Receipts for the Year 1900.

Jan.	3	John Donnelly & Co.	Repairing service attachment	$11 11
	3	John Donnelly & Co.	Plugging 3-inch main	9 37
	3	Donnelly Bros.	Repairing 6-inch main	9 06
	3	Bockius & Donnelly	Shut off	2 75
	4	Brush Electric Light Co.	Fire hydrant	28 86
	12	David McMahon	Repairing service attachment	8 63
	18	Penna. R. R. Co.	Raising 6-inch pipe	17 91
	18	Penna. R. R. Co.	Repairing 6-inch pipe	21 85
	19	Fredk. Wilkins	Repairing service attachment	2 22
	20	Union Traction Co.	Moving 6-inch stop	21 58
	20	Union Traction Co.	Shifting stops	44 45
	20	Union Traction Co.	Shifting pipe	7 50
	20	Union Traction Co.	Lowering 10-inch pipe	37 26
	20	Union Traction Co.	Shifting 6-inch W. D. stop	20 04
	20	Union Traction Co.	Shifting 6-inch W D. stop	20 76
	20	Union Traction Co.	Shifting 10-inch W. D. stop	28 71
	20	United Gas Improvement Co.	Repairing service connection	7 13
	23	York Manufacturing Co.	Repairing 4-inch stop	9 25
	25	People's Theatre	Renewing stop box	4 13
	29	John McBride	Repairing 3-inch main	11 70
Feb.	16	David McMahon	Repairing 6-inch service main	7 78
	16	David McMahon	Repairing service attachment	1 35
	16	David McMahon	Repairing 6-inch service main	33 54
	16	David McMahon	Redriving ferrule	3 25
	17	Bureau of Surveys	Connection to supply standpipe	6 70
	17	Bureau of Surveys	6-inch pipe in Subway	99 52
	21	Union Traction Co.	Repairing 6-inch stop	13 16
	23	Jos. Perna & Co.	Drawing ferrules	13 25
	28	John & James Dobson	Repairing 4-inch private connection	23 50
Mar.	8	Edward F. Bennis	Replacing pipe	
	17	Valentine Skipton	Empty oil barrels	347 14
	20	Union Traction Co.	Removing 6-inch stop	24 19

List of Miscellaneous Receipts for the Year 1900.

Mar. 20	Union Traction Co.	Repairing 4-inch fire connection	$21 48
26	Wm. Johnson	Renewing stop box	3 82
April 5	Philadelphia Inquirer Co.	6-inch fire connections	123 94
20	McCambridge & Co.	Material	3 02
24	David France	Plugging up ends of 3-inch main	36 95
27	United Gas Improvement Co.	Shut off	1 10
May 1	Jos. Perna	Raising 6-inch pipe	3 86
3	Broad Street Horse Bazaar	One horse	31 50
9	Wm. Sellers & Co.	10-inch fire connection	71 65
11	John B. Hamill	New stop box	4 75
15	Hotel Walton	Repairing fire hydrant	1 41
17	Richard Bennis	Repairing 4-inch main	15 48
21	Union Traction Co.	Resetting 15 stop boxes	59 25
21	Union Traction Co.	Lowering 4-inch service connections	20 80
21	Union Traction Co.	Moving 6-inch stop	21 45
25	Boon & Semple	Lowering 6-inch pipe	33 45
26	Edward F. Bennis	Shut off	2 13
June 13	Bureau of Water	Surplus stone	2 35
13	Bureau of Water	Overdrawn Warrant No. 2,587, 1899	4 37
13	Bureau of Water	Carcasses of two dead horses	6 00
13	Bureau of Water	Sale of horse	58 50
14	Edward F. Bennis	Watching ditch	6 11
14	Edward F. Bennis	Cutting out 12-inch pipe	8 92
20	Bureau of Water	Old stone	21 50
21	Union Traction Co.	Moving 6-inch stop	28 55
21	Union Traction Co.	Shifting 6-inch W. D. stop	21 18
21	Union Traction Co.	Repairing 6-inch main	9 32
22	Jos. Perna & Co.	Drawing ferrules	6 37
22	David Peoples	Shut off	2 95
22	David Peoples	Repairing 6-inch main	21 56
22	David Peoples	Repairing 6-inch main	12 20
22	David Peoples	Repairing 6-inch main	32 07
22	David Peoples	Repairing 6-inch main	14 16
22	David Peoples	Shut off	1 20

List of Miscellaneous Receipts for the Year 1900.

June 22	David Peoples	Repairing service attachment	$1 50
22	David Peoples	Shut off	1 10
22	David Peoples	Repairing 6-inch pipe	6 93
25	David Peoples	Repairing ¾-inch service attachment	2 42
25	David Peoples	Repairing 6-inch service main	5 77
25	David Peoples	Repairing ¾-inch service pipe	2 89
July 3	Jones & Wallace	Repairing 6-inch service main	6 51
3	Jones & Wallace	Redriving ferrules	1 90
3	Jones & Wallace	Shutting off	3 05
27	John Morrison	Repairing service pipe	49 31
27	John Morrison	Repairing service pipe	64 45
Aug. 1	Girard Iron & Metal Co.	Scrap iron	3,707 16
1	Girard Iron & Metal Co.	Scrap iron	106 71
20	United Gas Improvement Co.	Lowering 6-inch pipe	25 26
24	Bureau of Water	One horse	38 70
24	David McMahon	Shut off	3 50
24	David McMahon	Shut off	1 25
30	Thomas Miles	Moving No. 2 fire hydrant	20 00
31	Wetherill Bros.	No. 2 fire hydrant	9 47
Sept. 4	United Gas Improvement Co.	Changing 4-inch pipe	17 87
11	Weisbrod & Hess	Raising main	17 00
14	John Devlin	Repairing 6-inch main	16 70
Oct. 2	John Kerrigan	Repairing 6-inch main	10 04
3	George S. Boldt	Renewing stop box	5 12
27	David Peoples	Repairing private pipe	2 25
27	David Peoples	Repairing curb attachments	3 43
27	David Peoples	Repairing private pipe	11 63
Nov. 13	Continental Worsted Mills	Lowering 4-inch pipe	21 32
16	David McMahon	Repairing 6-inch main	10 06
16	David McMahon	Repairing 6-inch main	7 31
20	Union Traction Co.	Shifting 6-inch stop	35 63
Dec. 18	Howard Ruch	Repairing 6-inch main	29 38
18	Howard Ruch	Repairing 6-inch main	41 23
21	Union Traction Co.	Moving 10-inch stop	40 67

	g. Fees for Searches.	Charge for Ferrules on New Connections.	h. Miscellaneous.	Totals.
January . . .	$8 50	$322 00	$324 27	$21,328 26
February . .	10 50	304 00	202 05	292,085 17
March	15 75	631 00	408 96	218,783 16
April	18 00	604 00	165 01	329,660 84
May	15 75	741 00	265 73	1,680,083 15
June	16 75	590 00	277 92	95,005 21
July	11 75	525 00	125 22	55,155 37
August	17 50	824 00	3,912 05	157,182 69
September . .	14 75	693 00	51 57	51,601 98
October . . .	16 00	1,114 00	32 47	149,596 56
November . .	12 00	960 00	74 32	90,631 90
December . .	16 50	795 00	460 64	62,592 89
Total for	$173 75	$8,043 00	$6,300 21	$3,203,707 18
Total for	942 75	5,051 00	4,590 42	3,073,326 37
Increase	.....	$2,992 00	$1,709 79	$130,380 81
Decrease	$769 00			

a "Curr… alty is charged on unpaid schedule rents, and on September … These are… ged on rents still unpaid. If these penalties are paid on … Hence suc… rent." If paid after that date they are classed as "delin… are charge… nt" were charged in the preceding year.

b "Deli… e the City for the cost of laying service mains (mains to …

c "On … ay be made) in any street, the owners of property fronting … year, and … ollar per foot front on each side. For four months follow… or 120 days … ges are payable to the Receiver of Taxes. Upon the ex… the entire … e City Solicitor for lien and collection.

d "By … or certificates issued relative to municipal claims for pipe … "Charitab… schedule … April, 1895, inclusive, were included payments to the City … mum met… after the laying of water pipe. This, in 1895, amounted … quarterly, … fraction o… cluded, by the Receiver of Taxes, in the receipts from the … twice in … days the …

List of Miscellaneous Receipts for the Year 1900.

Dec. 21	Union Traction Co.....	Moving fire hydrant.....	$43 58
24	Bureau of Water.....	Overdrawn Warrant No. 2,087.....	1 75
24	Bureau of Water.....	Overdrawn Warrant No. 2,882.....	1 75
24	Bureau of Water.....	Sale of two dead horses.....	6 00
24	Bureau of Water.....	Sale of horse.....	41 40
24	John J. Johnson.....	Moving No. 2 fire hydrant...	11 88
26	S. W. Hellings.....	Empty barrels.....	243 00
			$3,300 21

Detailed Expenditures of the Bureau for 1900.

General Appropriation.		Amount appropri'd.	Amount expended.	Balance merging.	Balance not merg'g.
An Ordinance to make an appropriation to the Bureau of Water, approved Dec. 30, 1899,	$1,371,565 45				
Balance from books of 1899	786,514 02				
Additional appropriations and transfers	5,540,850 00				
	$7,698,929 47				
Diminished by transfer	14,270 75				
Net appropriation		$7,684,658 72			
Item 1—Salaries	$352,414 00				
Diminished by transfer	12,000 00				
Net appropriation to Item		340,414 00			
For Salary of 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	720 00		
Draughtsmen		7,200 00	7,200 00		
Genl. superintendent		3,500 00	2,041 70		
Asst. to genl. superintendent		900 00	900 00		
Clerks to genl. superintendent		2,000 00	2,000 00		
Assistants to Chief		3,600 00	2,766 65		
Pipe inspectors and clerk		2,200 00	1,987 51		
Search clerks		2,200 00	2,100 00		
Assistant clerks		3,650 00	3,650 00		
Chief inspector		1,200 00	1,200 00		
Inspectors		19,000 00	18,683 35		
Permit clerks		2,300 00	2,300 00		
Purveyors		9,200 00	9,177 97		
Clerks to Purveyors		4,800 00	4,533 28		
Asst. clerks to purveyors		4,500 00	4,471 37		
Hydrant inspectors		7,050 00	6,401 85		
General foremen		6,634 00	6,407 08		
Foremen of repairs		7,020 00	6,793 94		
Supt. of shop		1,500 00	1,500 00		
Clerk to supt. of shop		900 00	900 00		
Watchmen, office and yards		6,075 00	6,065 88		
Storekeepers		1,400 00	1,341 67		
Foreman machinist		1,500 00	1,500 00		
Foreman bricklayer		1,100 00	826 32		
Foreman carpenter		1,000 00	1,000 00		
Foreman stone mason		900 00	900 00		
Foreman painter		900 00	900 00		
Foreman rigger		900 00	900 00		
Foreman laborer		840 00	840 00		
Janitor, main office		720 00	720 00		
Lineman		1,000 00	1,000 00		

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriations.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 1—Continued.				
For Salary of Telephone operators.	$1,220 00	$1,192 22		
Electrician	1,200 00	1,200 00		
General storekeeper	1,000 00	620 94		
Yard keeper (Fourth District)	915 00	915 00		
SALARIES AT PUMPING STATIONS.				
Fairmount, engineers, oilers, etc.	12,950 00	12,761 96		
Spring Garden	82,560 00	80,535 30		
Belmont	26,040 00	24,554 51		
Belmont High Service	6,350 00	6,345 16		
Queen Lane	39,720 00	37,299 75		
Roxborough	25,180 00	21,929 31		
Roxborough High Service	7,700 00	7,570 30		
Mt. Airy	5,310 00	4,404 95		
Chestnut Hill	2,350 00	2,350 00		
Frankford	15,000 00	14,300 98		
Frankford High Service	7,350 00	3,841 28		
Total		$331,097 91	$9,316 09	
Item 2. For the purchase of coal, $400,000 00				
Increased by additional appropriation	45,000 00			
Net appropriation to Item	$445,000 00			
COAL FOR OFFICES AND SHOP.				
5 tons nut, at $5.20	$26 00			
7 tons bituminous, at $3.75	26 25			
7 tons stove, at $5.35	37 45			
7 tons stove, at $5.45	38 15			
10 tons stove, at $4.95	49 50			
22 tons bitumin's, at $3.59	74 96			
26.16 tons nut, at $5.06	150 93			
47.14 tons bit., at $3.59	171 41			
100 tons egg, at $4.69	469 00			
362.04 tons pea, at $3.13	1,133 71			
		$2,177 16		
COAL FOR STATIONS.				
68.17 tons buckwheat, Belmont, at $2.02	$139 08			
130 tons pea, Chestnut Hill, at $3.05	396 50			
202.4 tons pea, Frankford High Service, at $3.30	667 27			
904.13 tons buckw., Mt. Airy, at $2.25	1,974 72			
10,460.17 tons buckw., Frankford, at $2.10	21,967 80			
30,130.06 tons pea, Roxborough, at $2.80	84,364 84			
32,697.05 tons pea, Belmont, at $2.79	91,225 22			
35,282.02 tons pea, Queen Lane, at $3.05	107,610 42			

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Balance not merg'g
Item 2—Continued.				
65,505.06 tons buckw., Spring Garden, at $2.05. ..... $134,285.90				
.....	.....	$442,631 75		
Wood, 2 cords, at $9.00.....	.....	18 00		
Total	.....	$444,827 01	$172 99	
Item 3. For the purchase of oil, lubricants, paints, brushes, wood and coke, and for the hauling of Coal $12,000 00				
Increased by additional appropriation 6,500 00				
Net appropriation to Item.....	$18,500 00			
Coke	.....	$521 45		
Grease cups, 24 at 75c.....	.....	18 00		
Grease, lubricating, 1,098 lbs., at 7½c 82 35				
Grease, lubricating, 22,820 lbs., at 10c 2,282 00	.....	2,364 35		
Hauling coal 2,062 tons, at 38½ c...	.....	793 94		
Oil.				
5 gals. lard, at 40c..... $2 00				
203 gals. lard, at 47c..... 95 41	.....	97 41		
363 gals. gasoline, at 14c	.....	50 82		
410 gals. electric, at 15½c.....	.....	63 55		
49 gals. cylinder, at 32c... $15 68				
50 gals. cylinder, at 33c... 16 50				
2,568 gals. cylinder, at 30c 770 40				
4,582.36 gals. cylinder, at 35c. 1,603 84				
4,627 gals. cylinder, at 75c. 3,470 27	.....	5,876 69		
50½ gals. engine, at 22c... $11 11				
3,072 gals. engine, at 24c.. 737 28				
3,935.21 gals. engine, at 25c. 983 82				
4,541 gals. engine, at 50c.. 2,270 50	.....	4,002 71		
6,522½ gals. headlight, at 13c.....	.....	850 59		
Paints	.....	2,840 25		
Tallow, 1,707 lbs., at .07c.....	.....	119 49		
Wood, 6 cords, at $9.00.....	.....	54 00		
Total	.....	$17,653 25	$846 75	
Item 4. 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, $125,000 00				

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 4—Continued.				
Increased by additional appropriation . . . $20,000 00				
Net appropriation to Item	$145,000 00			
Transportation		$2,257 30		
Wages:				
Repairs to telephone line $104 00				
Bricklayers 11,309 80				
Carpenters 6,417 50				
Helpers 9,405 25				
Horses, carts and drivers 7,058 62				
Laborers 81,264 00				
Machinists 17,998 24				
Painters 3,997 50				
Stone masons 5,187 00				
		142,741 91		
Total		$144,999 21	$0 79	
Item 5. For wages of mechanics, drillers, caulkers, laborers and other workmen connected with the repairs to and improvement of the distribution, and the laying of service mains, and the transportation of workmen incident thereto $150,000 00				
Increased by additional appropriation . . . 95,000 00				
Net appropriation to Item	245,000 00			
Transportation		2,700 20		
Wages:				
Improvement $22,299 71				
First District 23,752 04				
Second District 31,022 26				
Third District 55,614 99				
Fourth District 40,996 63				
Fifth District 36,044 76				
Sixth District 32,193 17				
		241,923 56		
Total		$244,623 76	$376 24	
Item 6. For the wages of mechanics, helpers, laborers, and other workmen at the City construction and repair shop. $25,000 00				
Increased by additional appropriation 7,000 00				
Net appropriation to Item	$32,000 00	$31,957 01	$42 99	
Item 7. For the purchase of iron water pipe, special pipe, castings and pig lead	120,000 00			
Block tin, 500 lbs., at .29½c		149 38		

Detailed Expenditures of the Bureau for 1900.—Continued.

General Appropriation.		Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 7—Continued.					
Iron water pipe and special castings:					
8,395 lbs. ¼ turns, at 3¼c.	$314 81				
74,869 lbs. breeches pipe, at 4 3-10c.	402 61				
725½ hrs. machine w'k, at 50c.	362 62				
178,939 lbs. large specials, at 2.33c.	4,214 48				
727,771 lbs. small specials, at 2 2-10c	16,010 97				
12,000 6-in., 4,343,327 lbs., at 1.31c.	56,897 62				
500 8-in., 183,787 lbs., at 1.31c.	3,193 62				
500 10-in., 337,321 lbs., at 1.245c	4,187 20				
800 12-in., 733,296 lbs., at 1.245c.	9,129 54				
250 16-in., 334,551 lbs., at 1.245c.	4,165 15				
48-in., 15,760 lbs., at 1.292c	203 30				
		.....	$99,081 92		
Pig Lead.					
First District, 6,037 lbs., at 4.84c.	$292 19				
Second District, 229,987 lbs., at 4.84c.	11,131 38				
Third District, 131,115 lbs., at 4.84c.	6,347 71				
Fourth District, 43,183 lbs., at 4.84c.	2,090 06				
Sixth District, 10,106 lbs., at 4.84c.	489 13	.....	20,350 47		
Total		.....	$119,581 77	$418 23	
Item 8. For wages of the hydrographic corps	$1,600 00				
Diminished by transfers.	40 00				
Net appropriation to Item		$1,560 00	$1,560 00		
Item 9. For the purchase of hardware, bolts and nuts	$7,000 00				
Increased by additional appropriation	3,000 00				
Net appropriation to Item		10,000 00	9,894 65	$105 35	
Item 10. For the purchase of iron, steel and malleable castings,	$21,000 00				
Increased by additional appropriation	10,000 00				
Net appropriation to Item		31,000 00			

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.		Amount appropri'd.	Amount expended.	Balance merging.	Balance not merg'g
Item 10—Continued.					
STEEL CASTINGS.					
153½ lbs., at 12c.	$18 41				
468 lbs., at 10c.	46 80				
530 lbs., at 7½c.	39 75				
1,668 lbs., at 6c.	100 08				
		.....	$205 04		
IRON CASTINGS.					
40,646 lbs. grate bars	$812 92				
47,594 lbs. grate bars, at 2.1c.	999 47				
36,926 lbs. machinery at 3½c.	1,615 40				
33,160 lbs. machinery, at a4½c.	1,576 06				
47,025 lbs. loam, at 4c.	1,881 00				
80,000 lbs. mach. and misc., at 2½c.	2,000 00				
155,075 lbs. frame and covers, at 1½c.	2,713 83				
123,018 lbs. fire hydrant, at 2.74c.	4,000 00				
282,794 lbs. stop boxes, at 1.87c.	5,286 17				
404,545 lbs. F. H. and stops, at 2½c.	9,102 22				
		.....	29,987 07		
Machine work		.....	60 00		
Total		.....	$30,252 11	$747 89	
Item 11. For the purchase of gum goods and packing	$10,000 00				
Increased by additional appropriation	3,000 00				
Net appropriation to Item		$13,000 00	$12,722 65	$277 35	
Item 12. For repairs to boilers	$20,000 00				
Increased by additional appropriation	10,000 00				
Net appropriation to Item		30,000 00			
Fairmount	$4 50				
Belmont High Service	18 00				
Shop	100 08				
Frankford	1,524 72				
Frankford High Service (new work)	1,578 21				
Queen Lane	3,436 04				
Spring Garden	6,630 23				
Roxborough	8,099 34				
Belmont	8,601 44				
		.....	29,992 56	7 44	
Item 13. For the purchase of chandlery	$5,000 00				
Increased by additional appropriation	2,000 00				
Net appropriation to Item		7,000 00	5,841 71	1,158 29	

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 14. For the purchase of wr'ght iron pipe and fittings. $3,000 00				
Increased by additional appropriation 3,000 00				
Net appropriation to Item	$6,000 00	$5,897 52	$102 48	
Item 15. For the purchase of fire bricks and clay	1,500 00	983 60	516 40	
Item 16. For the purchase of brass fittings, cocks and valves, for steam and water $7,000 00				
Increased by additional appropriation 7,000 00				
Net appropriation to Item	14,000 00			
Brass fittings	. . . . .	5,673 56		
CORPORATION COCKS.				
12,001 ½-in., at 39.60c . . . $4,752 40				
1,140 ¾-in., at 44.50c 437 00				
200 ¾-in., at 63.25c 126 50				
200 1-in., at 96.50c, ... 193 00				
70 1¼ in., at $17.50 . . . . . 122 50				
100 1½ in., at $17.70 . . . . 177 00				
150 2-in., at $25.80 . . . . . 387 00				
	. . . . .	6,195 40		
CURB STOPS.				
4,260 ½-in., at 35c	. . . . .	1,491 00		
Rubber paint	. . . . .	41 87		
Total	. . . . .	$13,401 83	$598 17	
Item 17. For covering steam pipes and boilers	$2,000 00			
Frankford $28 59				
Queen Lane 28 83				
Spring Garden 198 38				
Belmont 198 90				
Roxborough 848 77				
	. . . . .	$1,303 47	$696 53	
Item 18. For the purchase of lumber $8,000 00				
Increased by additional appropriation 7,000 00				
Net appropriation to Item	15,000 00	14,995 71	4 29	
Item 19. For the purchase of forage $5,000 00				
Increased by additional appropriation 1,500 00				
Net appropriation to Item	6,500 00	5,945 72	554 28	
Item 20. For hauling water pipe and machinery	6,000 00	5,983 45	16 55	
Item 21. For the purchase of cement	4,000 00	3,979 88	20 12	

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging	Amount not merg'g.
Item 22. For the purchase of iron and steel $2,000 00				
Increased by additional appropriation 2,000 00				
Net appropriation to Item	$4,000 00	$3,927 54	$72 46	
Item 23. For the purchase of bricks, blocks, lime, sand, etc. $5,000 00				
Increased by additional appropriation 3,000 00				
Net appropriation to Item	8,000 00	7,647 58	352 42	
Item 24. For the purchase of electric supplies	2,500 00	2,493 07	6 93	
Item 25. For repairs to roofs	2,500 00	2,319 44	180 56	
Item 26. For the purchase of granite curb and coping stone	1,000 00	210 00	790 00	
Item 27. For the purchase of brass castings, etc. $5,500 00				
Increased by additional appropriation 3,000 00				
Net appropriation to Item	8,500 00			
200 lbs. Babbitt metal, at 14c. $28 00				
353 lbs. leaded iron, at 9c. 30 87				
550 lbs. expansion metal, at 24½c. 134 75				
6,295 lbs. lead coating, at 4½c. 330 60				
6,965 lbs. Ajax metal, at 33½c. 1,645 61				
18,072 lbs. yellow brass, at 15.90c. 2,873 45				
18,228½ lbs. red brass, at 18.90c. 3,456 57				
	. . . . .	8,499 85	15	
Item 28. For the purchase of stationery, blank books, engineers' supplies and printing. $7,500 00				
Increased by additional appropriation 1,000 00				
Net appropriation to Item	8,500 00			
Engineers' supplies	. . . . .	535 70		
Printing	. . . . .	640 41		
Stationery and blank books	. . . . .	6,768 42		
Total	. . . . .	$7,944 53	$555 47	
Item 29. For clerk hire in writing up duplicates $2,500 00				
Diminished by transfer. 199 30				
Net appropriation to Item	$2,300 70	$2,300 70		
Item 30. For keep of horses for Chief of Bureau, General Superintendent and Assistant	1,200 00	800 00	400 00	

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g
Item 31. For the purchase of horses and horse shoeing....$1,000 00				
Increased by additional appropriation 1,000 00				
Net appropriation to Item.....	$2,000 00			
Horse shoeing.....	.....	$485 81		
Horses, 7, at $164.....	.....	1,148 00		
Total	.....	$1,633 81	$366 19	
Item 32. For the purchase of meters to measure the flow of water through large pipes.....	$9,000 00			
1 20-in. Venturi meter... $925 00				
2 36-in. Pitot meters, at $1,225 .....2,450 00				
1 48-in. Pitot meter.....2,125 00				
1 48-in. Venturi meter...2,780 00				
	.....	$8,280 00	$720 00	
Item 33. For the purchase of tapping machine and fittings.....	5,000 00	4,998 25	1 75	
Item 34. For the purchase of and repairs to wagons and carts.....	2,000 00			
Cart $90 00				
Repairs 671 77				
Wagons 415 96				
	.....	1,177 73	822 27	
Item 35. For the purchase of and repairs to harness and stable supplies	1,000 00	705 64	294 36	
Item 36. For the purchase of donkey pumps and machine tools...	2,500 00	2,466 90	33 10	
Item 37. For asphalt paving and repairs	1,000 00	1,000 00		
Item 38. For advertising, office supplies, incidentals and text books, $4,000 00				
nIcreased by additional appropriation 1,000 00				
Net appropriation to Item.....	5,000 00			
Advertising.....	.....	362 90		
Awning.....	.....	3 50		
Carriage hire.....	.....	6 00		
Chairs.....	.....	26 00		
Clock.....	.....	5 00		
Clocks, care of.....	.....	15 00		
Disinfectors (rental).....	.....	36 00		
Dump, use of.....	.....	5 00		
Dynamite.....	.....	14 00		
Examination of water.....	.....	75 23		
Freight.....	.....	14 77		
Furnishing meals to workmen.....	.....	107 15		
Furnishing light.....	.....	160 92		
Ground rent, 918 Cherry street.....	.....	26 66		
Incidentals.....	.....	408 75		
Insurance (fire).....	.....	242 00		

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Balance merging.	Balance not merg'g.
Item 38—Continued.				
Listing		$11 25		
Maps		445 50		
Office supplies		991 68		
Paper hanging		11 25		
Pasture of horse		6 75		
Professional services (V. S.)		141 80		
Repairs to lock $2 90				
Repairs to pipe 6 20				
Repairs to pump 3 00				
		12 10		
Rent of office and shop, Fifth District		199 00		
Serving morning papers		23 92		
Subscription to periodicals		40 40		
Telegrams, etc.		8 02		
Tolls		5 94		
Traveling exp's (pipe inspectors)		1,359 99		
Typewriters' supplies		105 25		
Washing towels		127 40		
Total		$4,999 13	$0 87	
Item 39. For the purchase of special articles, small stores, repairs to wagons, harness, tools, etc., and for horse shoeing $3,000 00				
Increased by additional appropriation 2,000 00				
Net appropriation to Item	$5,000 00			
Bismuth		$141 75		
Boiler compound		308 40		
Brooms		3 75		
Casting		2 40		
Chain hoist		500 00		
Dynamite		443 14		
Horse shoeing		578 88		
Ice		997 08		
Joint clamps		18 75		
Listing		13 75		
Oil filter		45 00		
Plants		216 05		
Photo. outfit		100 00		
Plumbing		47 51		
Rent of stable, Fifth District		40 00		
Repairs to chairs $17 25				
Repairs to electric crane 95 00				
Repairs to gauge 3 55				
Repairs to jacks 20 20				
Repairs to pump 5 25				
Repairs to stoves 11 84				
Repairs to wagons 36 45				
Repairs to wheel 4 95				
Repairs to wires 11 45		205 94		
Scales		165 75		
Scales, repairs to		342 98		
Special articles		341 77		
Steel rails		10 40		
Total		$4,523 30	$476 70	

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g
Item 40. For the purchase of lead pipe and block tin	$10,000 00			
6,690 lbs. block tin, at 29½c.		$1,998 59		
152,938 lbs. lead pipe, at 5.23c.		7,998 66		
Total		$9,997 25	$2 75	
Item 41. For emergencies, $5,000 00				
Increased by additional appropriation 4,500 00				
Net appropriation to Item	$9,500 00	$5,822 85	$3,677 15	
Item 42. For the purchase of meters to measure the consumption of water	5,000 00			
Parts of meters		678 35		
1 ¾-in. Hersey $12 00				
1 1-in. Hersey 45 00				
1 2-in. Hersey 65 00				
1 3-in. Hersey 90 00				
1 4-in. Hersey 175 00				
1 6-in. Hersey 400 00				
		787 00		
1 ¾-in. Standard $11 25				
3 1-in. Standard, at $30 90 00				
1 2-in. Standard 45 00				
2 3-in. Standard, at $75 150 00				
2 4-in. Standard, at $120 240 00				
4 6-in. Standard, at $240 960 00				
		1,496 25		
4 1-in. Empire, at $20 $80 00				
1 3-in. Crown 135 00				
3 4-in. Crown, at $250 750 00				
10 3-in. Gem, at $90 900 00				
		1,865 00		
Total		$4,826 60	$173 40	
Item 43. For the erection of an electric plant at Roxborough	$4,000 00	$3,908 80	$91 20	
Item 44. To pay bills of the Bell Telephone Co. $3,524 95				
Diminished by transfer. 326 50				
Net appropriation to Item	3,524 95	3,524 95		
Item 45. For the purpose of furnishing water to the citizens of Fox Chase, balance Jan. 1	59,299 17			
Boilers		14,925 00		
Engine and boiler house		13,859 00		

Detailed Expenditures of the Bureau for 1900.—Continued

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 45—Continued.				
Pumping engine (on account)	.....	$8,888 00		
Standpipe	.....	12,650 00		
Total		$50,332 00	.....	$8,977 17
Item 46. For the improvement of Roxborough Pumping Station, balance Jan. 1	$68,500 00			
Boilers	.....	$8,500 00		
Pumping engines (on account)	.....	30,000 00		
Total		$38,500 00	.....	$30,000 00
Item 47. Repairs to and improvement of reservoirs, balance Jan. 1	$4,611 63	.....	$4,611 63	
Item 48. For new pumping main from Queen Lane Pumping Station to reservoir, balance Jan. 1	2,252 35	.....	.....	$2,252 35
Item 49. For repairs to engines, balance Jan. 1	19,950 00	$16,300 00	.....	3,650 00
Item 50. For improvement in West Philadelphia, balance Jan. 1	444,246 58			
Iron water pipe: 127 30-in., 484,154 lbs., at 1.259c. $6,095 50				
Less 10 per cent. 609 55	.....	5,485 95		
Retained percentage upon contract for iron pipe	.....	6,316 14		
Wages, Second District	.....	28,570 68		
Total		$40,372 77	.....	$408,873 81
Item 51. For two pumping engines, engine and boiler houses at Roxborough Pumping Station, 36-inch main from Roxborough to reservoir, pumping engine at Roxborough and Belmont High Service Stations; lowering suction main at Queen Lane Pumping Station, and 48-inch main on Nicetown lane, balance Jan. 1	$187,654 29			
Driving piles	.....	$150 40		
Engine and boiler houses	.....	77,488 00		
Excavating pipe trench: 3,311.5 cubic yards, at 65c. $2,152 47				
Less 20 per cent. 430 49	.....	1,721 98		
Pumping engine, Belmont High Service (on account)	.....	11,125 00		

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Balance merging.	Balance not merg'g.
Item 51—Continued.				
Pumping engine Roxborough High Service (on account)		$16,687 50		
Pumping engine Roxborough (on account)		30,000 00		
Retained percentage upon contract for excavating pipe trench		1,199 91		
Total		$138,372 79		$47,576 55
Item 52. For the improvement, extension and filtration of the water supply	$2,000,000 00			
Advertising		$186 35		
Analyses of sand		257 50		
Block granite		938 00		
Boiler, Belmont		4,750 00		
Brass fittings		1,848 64		
Bricks, lime, stone, etc.		6,000 00		
Carpenter work		201 99		
Cement		4,851 87		
Chemicals		4,160 12		
Chain belt		71 11		
Coke		572 20		
Condensers		4,870 00		
Conduit (Belmont)		20,776 00		
Conduit (Queen Lane)		33,957 00		
Covering steam pipe		130 01		
Donkey pump		100 00		
Electric plant (Queen Lane)		3,796 30		
Electric supplies		1,179 17		
Engineers' supplies		2,972 22		
Freight		20 28		
Gas		38 90		
Gum goods		1,041 23		
Hardware		2,716 04		
Hauling		1,471 99		
Hose reel		35 00		
Ice machine		768 56		
Incidentals		373 13		
Insurance (fire)		50 00		
Iron fittings		3,027 21		
Iron safe		175 00		
Iron pipe and special castings:				
200 12-in., 183,152 lbs., at 1.245c.		2,280 24		
350 16-in., 465,392 lbs., at 1.245c.		5,794 13		
760 20-in., 1,307,894 lbs., at 1.25c. $16,336 29				
Less 10 per cent. 1,633 62		14,692 67		
696 30-in., 2,423,584 lbs., at 1.27c.		30,779 64		
375 36-in., 2,961,096 lbs., at 1.24c.		36,717 36		
1,132 48-in., 9,068,440 lbs., at 1.29c.		114,428 63		
159,999 lbs. casting, at 2½c.		4,000 00		
336,517 lbs. casting, at 2.35c		7,908 15		

Detailed Expenditures of the Bureau for 1900—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'd
Item 52—Continued.				
28,027 lbs. casting, at 4.3c.	.....	$1,205 16		
2,863 hours machine work, at 50c.	.....	1,431 50		
Laboratory supplies	.....	182 50		
Laying gas main	.....	205 66		
Lumber	.....	6,442 86		
Maps	.....	242 26		
Meals for workmen	.....	19 60		
Moving gas main	.....	720 20		
Office furniture and supplies	.....	1,629 66		
Paints	.....	199 35		
Packing	.....	4,082 77		
Pig lead	.....	30,000 00		
Platinum wire	.....	649 50		
Plumbing	.....	959 00		
Printing	.....	52 74		
Refrigerator	.....	163 50		
Roofing slate	.....	10 20		
Sand sifter	.....	138 75		
Sand washing machine	.....	221 30		
Sand and gravel	.....	1,230 42		
Stationery	.....	2,005 36		
Steel	.....	180 91		
Subscription	.....	8 00		
Slag	.....	62 37		
Tanks	.....	467 00		
Text books	.....	228 03		
Test borings	.....	7,739 16		
Testing station	.....	11,653 54		
Transportation	.....	528 15		
Water meters	.....	1,127 55		
Wire cloth	.....	15 80		
Wages:				
Consulting engineer	.....	5,840 00		
Engineer corps	.....	22,256 62		
Buildings, grounds and reservoirs	.....	1,916 56		
Second District	.....	12,440 68		
Third District	.....	102,170 27		
Fourth District	.....	20,119 00		
Fifth District	.....	9,490 28		
Sixth District	.....	5,076 59		
		$571,485 69	.....	$1,428,514 31
Item 53. For hauling ashes from Queen Lane Station	$3,350 00	3,202 25	$147 75	
Item 54. Improvement and filtration	3,000,000 00	.....	.....	3,000,000 00
Item 55. For a direct water supply for fire purposes	300,000 00	.....	.....	300,000 00

Detailed Expenditures of the Bureau for 1900—Continued.

RECAPITULATION.

General Appropriation.			
Balance from books of 1899	$786,514 02		
Additional appropriation and transfers	5,540,850 00	$6,327,364 02	
Annual appropriation		1,371,565 45	$7,698,929 47
Expended for maintenance	1,574,704 95		
Expended for extension	855,353 25	2,430,058 20	
Amount merging	30,645 38		
Amount not merging	5,223,955 14		
Amount transferred	14,270 75	5,268,871 27	7,698,929 47

APPENDIX B.

REPORT

OF THE

GENERAL SUPERINTENDENT

SUBMITTING

TABLES OF EXPENSES, PUMPAGE AND CONSUMPTION OF WATER DURING 1900.

Philadelphia, February 18, 1901.

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

DEAR SIR:—I have the honor to submit the following tables showing the operating expenses and the work performed at the several pumping stations of the Bureau, which have been under my immediate charge since June 1, and the consumption of water during the year 1900.

The tables of expenses show an increase in the cost per million gallons of water pumped 100 feet high, which is mainly due to the advance in the prices of coal and small stores, to the increase in the force employed on new machinery, and to the additional items of expense for repairs and labor, charged to cost of pumpage but not heretofore included in these items of expense.

The pumpage tables show the average daily, maximum,

minimum, monthly and total pumpage and consumption for the year, and it is gratifying to note the unusual event of a decrease, in the latter of more than one billion gallons.

This decrease is partly due to the increased efficiency of some of the old pumps and the installation of four new engines at the Roxborough station, which were in service during the latter half of the year, instead of the badly crippled pumps Nos. 1, 2 and 3.

The decrease in consumption, however, was, to a far greater extent, due to a reduction in the waste of water by consumers, and attributed to the substitution of improved hopper fixtures, as required by the recent ordinance of Councils,, as well as to the checking of considerable waste discovered and reported to this office for correction by house-to-house inspectors.

Repairs to machinery, preparatory to the demands of the summer season, are now under way, and, with the aid of the additional force of machinists recently appointed, it is expected, by the opening of the season, to have all the pumps in good repair.

Yours respectfully,,

ALLEN J. FULLER,
General Superintendent.

Relative Speed of Water, A, B (through valves).	
Speed (feet per second) through Valves.	
Mean Pressure on Pumps at Pressure Gauge (pounds per square	
Diameter of Steam Drum (inches).	
Length of Steam Drum (feet).	
Length of Grate (feet).	
Area of Grate (square feet).	
Area of Heating Surface (square feet).	
Estimated Horse-power, at 10 square feet for Shell and Fire Flues, 15 square feet for Tubes and 12 square feet for Drums.	
Height of Stack (feet).	
Section of Stack (square feet).	

PHILAD

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

FRANKFORD HIGH SERVICE STATION.

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

1900.	Running Time of Engine in Hours.	Gallons Pumped by 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. 1.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 1.	
January											
February											
March											
April											
May											
June											
July											
August					11						
September	135	10,194,658	10,194,658	339,821	25		.25	15	15	70	251.8
October	221	15,137,604	15,137,604	488,309	26	1,415	.25	16	8	70	350.9
November	291	26,144,935	26,144,935	871,497	42	705	.25	48	38	70	381.5
December	93	8,850,860	8,850,860	285,511	28	2,076	.25	39	23	70	188.9
Totals and averages	740	60,328,057	60,328,057	494,492	133	1,956	.25	118	84	70	303.1

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

CHESTNUT HILL PUMPING STATION.

Total Capacity, 750,000 gallons per day.

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

1900.	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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 1.	No. 2.	
January	.....	64	.....	2,572,960	2,572,960	82,998	15	530	.25	5	.....	.....	50	86.8
February	.....	68	.....	2,809,320	2,809,320	100,332	10	739	.25	5	.....	.....	50	95.6
March	.....	70	.....	2,917,560	2,917,560	94,114	15	863	.25	5	.....	.....	50	95.5
April	.....	62	.....	2,592,840	2,592,840	86,428	14	1,392	.25	4	.....	.....	50	89.3
May	.....	94	.....	3,778,560	3,778,560	121,889	18	338	.25	7	.....	.....	50	104.8
June	.....	61	.....	2,551,020	2,551,020	85,034	15	800	.25	4	.....	.....	50	83.6
July	.....	63	.....	2,595,000	2,595,000	83,709	15	511	.25	5	.....	.....	50	85.8
August	.....	57	.....	2,176,460	2,176,460	70,208	10	870	.25	4	.....	.....	50	105.5
September	.....	67	.....	2,791,800	2,791,800	93,060	15	1,339	.25	5	.....	.....	50	90.4
October	.....	74	.....	2,994,620	2,994,620	96,600	16	1,303	.25	5	.....	.....	50	90.9
November	.....	54	.....	2,258,280	2,258,280	75,276	13	1,535	.25	4	.....	.....	50	83.1
December	.....	59	.....	2,467,180	2,467,180	79,586	14	1,928	.25	4	.....	.....	50	83.6
Totals and averages	.....	793	.....	32,505,600	32,505,600	89,056	175	948	.25	57	.....	.....	50	93.3

Total Capacity, 3,000,000 Gallons per Day.

MOUNT AIRY PUMPING STATION.

No. 1—Davidson Rotary, Capacity, 1,000,000 Gallons per Day.
No. 2—Davidson Rotary, Capacity, 1,000,000 Gallons per Day.
No. 3—Knowles Rotary, Capacity, 1,000,000 Gallons per Day.

1900.	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	8	744	.....	360,000	34,571,250	.....	34,931,250	1,126,814	104	1,040	.25	65	16	60	60	.....	168.5
February	8	665	.....	377,500	30,990,010	.....	31,367,510	1,120,268	93	1,680	.25	56	14	60	60	.....	168.6
March	.....	744	.....	.....	34,743,750	.....	34,743,750	1,120,766	103	1,780	.25	15	16	.....	60	.....	168.7
April	.....	720	.....	.....	33,656,250	.....	33,656,250	1,121,875	100	1,000	.25	60	15	.....	60	.....	168.8
May	2	744	.....	90,000	34,824,750	.....	34,914,750	1,126,282	103	1,780	.25	62	16	60	60	.....	169.1
June	.....	720	.....	.....	33,762,250	.....	33,762,250	1,125,408	100	1,000	.25	60	15	.....	60	.....	169.0
July	.....	744	.....	.....	34,879,500	.....	34,879,500	1,125,145	103	1,780	.25	62	16	.....	60	.....	169.3
August	26	720	.....	1,222,500	34,050,400	.....	35,272,900	1,137,835	100	1,780	.25	62	16	60	60	.....	171.2
September	9	720	.....	405,000	33,795,000	.....	34,200,000	1,140,000	94	440	.25	59	15	60	60	.....	180.2
October	12	736	.....	540,000	34,398,750	.....	34,938,750	1,127,056	83	680	.25	32	16	60	60	.....	210.9
November	16	704	.....	768,750	32,912,750	.....	33,681,500	1,122,716	80	800	.25	30	15	60	60	.....	211.2
December	160	584	.....	7,526,250	27,357,500	.....	34,883,750	1,125,282	95	1,700	.25	31	15	60	60	.....	183.1
Totals and averages	241	8,545	.....	11,290,000	399,942,160	.....	411,232,160	1,126,663	1,164	2,020	.25	594	185	60	60	.....	177.9

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

ROXBOROUGH HIGH SERVICE STATION.

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

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

1900.	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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 1.	No. 2.	
January	744	.....	110,719,910	.....	110,719,910	3,571,610	172	1,960	.25	124	8	56	.....	335.9
February	672	.....	99,435,600	.....	99,435,600	3,551,271	154	1,700	.25	112	7	56	.....	337.0
March	744	.....	111,483,010	.....	111,483,010	3,596,226	169	1,300	.25	124	32	56	.....	344.8
April	720	.....	109,378,980	.....	109,378,980	3,645,966	169	1,560	.25	120	8	56	.....	338.1
May	743	.....	115,357,590	.....	115,357,590	3,721,212	172	1,760	.25	124	8	56	.....	350.2
June	720	.....	114,154,920	.....	114,154,920	3,805,164	164	1,450	.25	120	7	56	.....	363.6
July	744	.....	121,698,720	.....	121,698,720	3,925,765	178	1,070	.25	124	8	56	.....	357.6
August	742	.....	118,612,110	.....	118,612,110	3,826,197	174	1,550	.25	124	8	56	.....	356.1
September	715	4	114,953,850	738,150	115,692,000	3,856,400	175	1,460	.25	125	8	56	56	345.5
October	648	97	100,362,240	14,251,454	114,613,694	3 697,215	171	1,210	.25	160	8	56	56	350.5
November	529	174	79,990,380	29,382,015	109,372,395	3,645,746	158	1,680	.25	188	7	56	56	361.4
December	600	144	90,008,820	26,128,620	116,137,440	3,746,369	376	2,160	25	220	8	56	56	362.7
Totals and averages	8,321	419	1,286,156,130	70,500,239	1,356,656,369	3,716,866	2,240	940	.25	1,665	117	56	56	317.6

No. 1.—Cramp, Marine Compound Rotary, Capacity, 10,000,000 gallons per day.
No. 2.—Corliss Compound Rotary, Capacity, 10,000,000 gallons per day.

FRANKFORD PUMPING STATION.

Total Capacity, 42,000,000 gallons per day.

No. 3.—Southwark Vertical Compound Rotary, Capacity, 22,000,000 gallons per day.

1900.	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 and Mean Suction Lift in pounds per square inch.			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	186	91	598	69,839,025	34,784,115	393,624,760	498,247,900	16,072,512	827	814	.25	327	531	73	72	69	508.9
February	181	132	479	65,674,725	40,856,580	305,689,030	412,220,335	14,722,154	733	440	.25	294	478	77	73	70	475.1
March	144	35	718	51,875,020	13,293,120	476,065,930	541,234,070	17,459,163	838	1,320	.25	385	575	75	70	70	552.0
April	385	165	427	143,915,450	61,746,030	283,334,260	488,995,740	16,299,858	811	370	.25	434	741	74	72	72	509.4
May	570	369	271	224,372,920	137,604,320	180,383,010	542,360,250	17,495,491	940	1,307	.25	414	714	79	75	76	487.2
June	590	325	376	219,246,960	116,796,629	243,450,900	579,494,489	19,316,482	916	1,415	.25	274	466	80	78	80	534 2
July	393	59	670	143,138,337	21,724,125	458,012,160	622,874,622	20,092,729	891	318	.25	334	618	80	73	80	590.6
August	558	143	644	207,985,532	43,299,984	443,375,374	694,660,890	22,408,415	953	1,295	.25	235	496	77	74	72	615.6
September	704	286	637	267,692,010	84,653,895	421,996,710	774,342,615	25,811,420	1,036	1,890	.25	249	519	73	72	67	631.1
October	720	345	428	272,780,453	129,798,240	288,047,400	710,626,093	22,923,422	1,015	1,773	.25	232	437	74	70	69	591.2
November	609	550	203	231,777,964	206,857,410	132,899,390	571,534,764	19,051,158	910	2,085	.25	238	383	74	70	72	530.2
December	707	669	21	269,425,190	252,163,950	14,807,470	536,396,610	17,303,116	932	1,095	.25	268	382	74	70	70	486.6
Totals and averages	5,747	3,169	5,472	2,187,723,586	1,143,578,398	3,641,686,394	6,972,988,378	19,104,077	10,808	682	.25	3,684	6,340	76	72	72	586.5

BELMONT HIGH SERVICE STATION.

Total Capacity, 7,000,000 Gallons per Day.

No. 1. Worthington Duplex, Capacity, 2,000,000 galls. per day.

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

1900.	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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 1.	No. 2.	
January	337	.....	16,196,490	.....	16,196,490	522,467	73	775	.25	46	8	63	.....	118.2
February	319	.....	15,355,170	.....	15,355,170	548,398	68	1,745	.25	42	7	63	.....	119.6
March	355	.....	17,061,303	.....	17,061,303	550,364	79	505	.25	46	8	64	....	115.4
April	374	.....	17,982,360	.....	17,982,360	599,412	75	1,650	.25	45	8	63	.....	127.2
May	486	.....	23,390,375	.....	23,390,375	754,528	84	95	.25	48	8	63	.....	149.1
June	534	.....	25,662,005	.....	25,662,005	855,400	88	2,160	.25	45	8	63	.....	154.5
July	578	.....	27,751,670	.....	27,751,670	895,215	104	1,625	.25	46	8	63	.....	142.0
August	557	.....	26,769,410	.....	26,769,410	863,529	101	55	.25	46	8	63	.....	142.0
September	522	.....	25,038,305	.....	25,038,305	834,610	95	1,950	.25	45	7	63	.....	139.8
October	463	.....	22,254,760	.....	22,254,760	717,895	90	1,950	.25	46	8	63	.....	131.2
November	411	.....	19,741,815	.....	19,741,815	658,060	86	1,005	.25	45	8	63	.....	122.3
December	383	10	18,418,995	1,697,500	20,116,495	648,919	87	1,220	.25	85	8	64	65	123.1
Totals and averages.	5,319	10	255,622,658	1,697,500	257,320,158	704,986	1,036	1,295	.25	585	94	63	65	133.0

No. 2.—Snow pump, 500,000 gallons, removed to Belmont Station on Oct. 9, 1900, now used as a donkey pump.

APPENDIX C.

REPORT

OF THE

Assistant in Charge of Distribution

Philadelphia, February 2, 1901.

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 1900:

Mains.

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

New Work.

Service mains laid	109,159 feet.
Supply mains laid	57,516 feet.
Pumping mains laid	15,186 feet.
Fire mains laid	2,799 feet.
Connections, etc.	11,518 feet.
Total	196,178 feet.

Comparison of conditions relating to the distribution, 1899-1900:

	1899	1900	Increase.	Decrease.
Service mains, 3-in. to 16-in	97,656	109,159	11,503	
Supply mains, 10-in. to 48-in	9,891	57,516	47,625	
Pumping mains, 16-in. to 36-in	7,833	15,186	7,353	
Fire main, 10-in		2,799	2,799	
Connections and miscellaneous work	13,413	11,518		1,895
Totals in feet	128,793	196,178	69,280	1,895
Re-laid, 4-in to 48-in	86,727	32,282		54,445
Miscellaneous repairs, 3-in to 48-in	4,408	3,643		765
Taken up, 3-in. to 48-in	69,880	25,068		44,812
Lowered, raised, and shifted, 4-in. to 48-in	3,773	3,222		551
Totals in feet	164,788	64,215		100,573
Pipe cut off and abandoned, 3 in. to 20 in.	20,798	9,259		11,539

Meters.

	1899	1900	Increase.	Decrease.
Meters in use	1,344	1,268		76

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

	1899	1900	Increase.	Decrease.
Dwellings with water	232,334	237,011	4,677	
Dwellings without water	12,264	12,467	203	
Water closets	216,850	232,457	15,607	
Baths	167,464	273,477	106,013	
Wash paves	92,744	94,346	1,602	
Basins and sinks	89,826	97,252	7,426	
Urinals	5,012	5,249	237	

Repairs.

Mains re-laid	32,282 feet	
Repairs and connections	3,643 feet	
		35,925 feet.
Old pipe taken up	25,068 feet	
Pipe lowered, raised and shifted	3,222 feet	
		28,290 feet.
Total		64,215 feet.

Abandoned.

Three-inch	2,611 feet.
Four-inch	2,677 feet.
Six-inch	2,540 feet.
Eight-inch	42 feet.
Twelve-inch	270 feet.
Forty-eight inch	1,119 feet.
Total	9,259 feet.

The total quantity of pipe handled for all purposes throughout the year was 260,393 feet, weighing 27,110,328 pounds.

The total quantity of new pipe laid was 196,178 feet, or 37.16 miles, making, in addition to that previously laid, 1.338.43 miles now in use.

Fire Hydrants.

New style fire hydrants in new locations	542
Old style fire hydrants in new locations	...
New style fire hydrants in place of old style	288
Old style fire hydrants in place of other of the old style	...
Total	830
New style fire hydrants taken out	62
Old style fire hydrants taken out	30
Total	92

The total number of new style fire hydrants added to the distribution system was 450, and the total number in

use December 31, 1900, was 12,620, of which 653 are of the old style and 11,967, or 94.8 per cent. ore of the new pattern.

Drills for Attachments.

The following new attachments were made to the mains:

One-half inch	4,542	area of openings..	892 square inches.
Five-eighth inch	271	area of openings..	83 square inches.
Three-quarter inch ..	77	area of openings..	34 square inches.
One inch	101	area of openings..	79 square inches.
One and one-quarter inches	11	area of openings..	13 square inches.
One and one-half in..	36	area of openings..	64 square inches.
Two inches	73	area of openings..	229 square inches.
Three inches	10	area of openings..	71 square inches.
Four inches	14	area of openings..	176 square inches.
Six inches	13	area of openings..	368 square inches.
Total	5,148	area of openings..	2,009 square inches.

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

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

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

Respectfully submitted,

W. WHITBY,
Assistant in Charge of Distribution.

SERVICE AND SUPPLY MAINS LAID DURING 1900.

First District.

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

	Purposes for which used.		Size in Inches. 3	4	6	8	10	12	20	Total in feet and pounds.
New pipe or feet added.	Service mains				7,486	1,772	3,121			12,379
	Fire hydrant connections				453					453
	Fire connections (private)				95					95
	Supply connections (private)			54						54
	Motor connections (private)			16	17					33
	Total	Feet		70	8,051	1,772	3,121			13,014
		Pounds		1,330	265,683	74,424	171,655			513,092
Pipe used but adding nothing to feet in ground.	Pipe relaid				4,924			398		5,322
	Repairs, general			7	232	3	7	5	4	258
	Pipe taken up		406	4,064	437					4,907
	Total	Feet	406	4,071	5,593	3	7	403	4	10,487
		Pounds	6,090	77,349	184,569	126	385	29,016	636	298,171
Total handled		Feet	406	4,141	13,644	1,775	3,128	403	4	23,501
		Pounds	6,090	78,679	450,252	74,550	172,040	29,016	636	811,263
Pipe cut off and abandoned			11	311	192					514

Second District.

Comprising the 5th, 6th, 7th, 8th, 9th, 10th, 24th, 27th, 34th and 40th Wards.

	Purposes for which used.	Size in Inches. 3	4	6	8	10	12	16	20	30	Total in feet and pounds.
New pipe or feet added.	Service mains			24,549	1,062	3,159					28,770
	Supply mains						5,002	1,750	3,516	14,036	24,304
	Supply main connections			135	154	198	40		16		543
	Fire hydrant connections			1,395							1,395
	Fire connections (private)	8	91	432							531
	Supply connections (private)	119	51	55							225
	Drains		36	208	40	48					332
	Total Feet	127	178	26,774	1,256	3,405	5,042	1,750	3,532	14,036	56,100
	Total Pounds	1,905	3,382	883,542	52,752	187,275	363,024	192,500	561,588	4,659,952	6,905,920
Pipe used, but adding nothing to feet in ground.	Pipe relaid			4,195		1,518					5,713
	Repairs general	38	9	711	46	63	35		18		920
	Pipe taken up	2,440	156	694	150						3,440
	Pipe lowered			50	197						247
	Pipe raised			70			278				348
	Pipe shifted			70							70
	Total Feet	2,478	165	5,790	393	1,581	313		18		10,738
	Total Pounds	37,170	3,135	191,070	16,506	86,955	22,536		2,862		360,234
	Total handled Feet	2,605	343	32,564	1,649	4,986	5,355	1,750	3,550	14,036	66,838
	Total handled Pounds	39,075	6,517	1,074,612	69,258	274,230	385,560	192,500	564,450	4,659,952	7,266,154
	Pipe cut off and abandoned	1,644	64	899	42						2,649

Third District.

Comprising the 11th, 12th, 16th, 17th, 18th, 19th, 23d, 25th, 35th, 41st, and part of 22d, 33d, and 37th Wards.

	Purposes for which used.	Size in Inches. 3	4	6	8	10	12	16	20	30	36	48	Total in feet and pounds.
New pipe or feet added.	Service mains			22,490	2,275	12,758	1,816						39,339
	Supply mains					3,910	562	8		8,890	4,574	9,545	27,489
	Pumping mains							5,071	7,953				13,024
	Supply main connections				29	234	34		25				322
	Pumping main connections					149							149
	Fire hydrant connections			1,921									1,921
	Fire connections (private)	31	51	193			7						282
	Supply connections (private)	28	33	63									124
	Drains			142									142
	Total Feet	59	84	24,809	2,304	17,051	2,419	5,079	7,978	8,890	4,574	9,545	82,792
	Total Pounds	885	1,596	818,697	96,768	937,805	174,168	558,690	1,268,502	2,951,480	1,930,228	5,583,825	14,322,644
Pipe used but adding nothing to feet in ground.	Pipe relaid			10,906	17	860							11,783
	Repairs, general		3	735	13	50	9	14		7			831
	Pipe taken up		8,421	1,568									9,989
	Pipe lowered			471			342			96			909
	Pipe raised			310									310
	Total Feet		8,424	13,990	30	910	351	14		103			23,822
	Total Pounds		160,056	461,670	1,260	50,050	25,272	1,540		34,196			734,044
	Total handled Feet	59	8,508	38,799	2,334	17,961	2,770	5,093	7,978	8,993	4,574	9,545	106,614
	Total handled Pounds	885	161,652	1,280,367	98,028	987,855	199,440	560,230	1,268,502	2,985,676	1,930,228	5,583,825	15,056,688
	pe cut off and abandoned		1,152	771									1,923

FOURTH DISTRICT.

Comprising the Thirteenth, Fourteenth, Fifteenth, Twentieth, Twenty-eighth, Twenty-ninth, Thirty Second and part of Thirty-seventh and Thirty-eighth Wards.

	Purposes for which used.	Size in Inches. 3	4	6	8	10	12	16	18	30	36	48	Total in feet and pounds.
New pipe or feet added.	Service mains	78	147	9,368	600	.....	2,786	.....	.....	.....	.....	.....	12,979
	Supply mains	.....	.....	.....	.....	.....	5,085	638	.....	.....	.....	.....	5,723
	Fire mains	.....	.....	.....	.....	2,799	.....	.....	.....	.....	.....	.....	2,799
	Service main connections	.....	.....	65	.....	13	.....	.....	.....	.....	.....	.....	78
	Supply main connections	.....	.....	118	.....	59	66	.....	.....	.....	.....	.....	243
	Fire hydrant connections	.....	.....	1,461	.....	.....	.....	.....	.....	.....	.....	.....	1,461
	Fire connections (private)	.....	36	71	.....	18	.....	.....	.....	.....	.....	.....	125
	Supply connections (private)	66	22	141	.....	.....	.....	.....	.....	.....	.....	.....	229
	Drains	.....	.....	132	37	.....	.....	.....	.....	.....	.....	.....	169
	Total Feet	144	205	11,356	637	2,889	7,937	638	.....	.....	.....	.....	23,806
	Total Pounds	2,160	3,895	374,748	26,754	158,895	571,464	70,180	.....	.....	.....	.....	1,208,096
Pipe used, but adding nothing to feet in ground.	Pipe relaid	.....	.....	5,286	.....	1,028	194	.....	.....	.....	.....	.....	6,508
	Repairs, general	.....	4	624	28	45	10	.....	10	13	12	5	751
	Pipe taken up	38	4,951	1,021	.....	.....	.....	.....	.....	.....	.....	.....	6,010
	Pipe lowered	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	317	317
	Pipe shifted	.....	.....	.....	216	.....	.....	.....	.....	.....	.....	.....	216
	Total Feet	38	4,955	6,931	244	1,073	204	.....	10	13	12	322	13,802
	Total Pounds	570	94,145	228,723	10,248	59,015	14,688	.....	1,400	4,316	5,064	188,370	606,539
	Total handled Feet	182	5,160	18,287	881	3,962	8,141	638	10	13	12	322	37,608
	Total handled Pounds	2,730	98,040	603,471	37,002	217,910	586,152	70,180	1,400	4,316	5,064	188,370	1,814,635
Pipe cut off and abandoned		.....	212	447	.....	.....	.....	.....	.....	.....	.....	.....	659

Fifth District.

Comprising the 21st and part of the 38th Wards.

	Purposes for which used.	Size in Inches. 3	4	6	8	10	12	30	36	48	Total in feet and pounds.
New Pipe or feet added.	Service mains			2,817							2,817
	Pumping mains								2,162		2,162
	Supply main connections						12				12
	Pumping main connections							165			165
	Bye-pass connections			18							18
	Fire hydrant connections			447							447
	Drains		135	877	84						1,096
	Total Feet		135	4,159	84		12	165	2,162		6,717
	Total Pounds		2,565	137,247	3,528		864	54,780	912,364		1,111,348
Pipe used but adding nothing to feet in ground.	Pipe relaid			92			94			246	432
	Repairs, general	20	22	213		14	12		23	124	428
	Pipe taken up		99	104						143	346
	Pipe lowered			382							382
	Pipe shifted			119			175				294
	Total Feet	20	121	910		14	281		23	513	1,882
	Total Pounds	300	2,299	30,030		770	20,232		9,706	300,105	363,442
	Total handled Feet	20	256	5,069	84	14	293	165	2,185	513	8,499
	Total handled Pounds	300	4,864	167,277	3,528	770	21,096	54,780	922,070	300,105	1,474,790
Pipe cut off and abandoned			28	20						1,119	1,167

Sixth District.

Comprising part of 22d, 33d, 37th and 38th Wards.

	Purposes for which used.	Size in Inches.								Total in feet and pounds.
		3	4	6	8	10	12	16	30	
New pipe or feet added.	Service mains			10,727	35		2,113			12,875
	Bye-pass connections			24						24
	Fire hydrant connections			822						822
	Fire connections (private)		14							14
	Motor connections (private)		14							14
	Total Feet		28	11,573	35		2,113			13,749
	Total Pounds		532	381,909	1,470		152,136			536,047
Pipe used but adding nothing to feet in ground.	Pipe relaid			2,019			505			2,524
	Repairs general	6	15	325		26	73	5	5	455
	Pipe taken up		129	20			227			376
	Pipe lowered			25			104			129
	Total Feet	6	144	2,389		26	909	5	5	3,484
	Total Pounds	90	2,736	78,837		1,430	65,448	550	1,660	150,751
Total handled	Feet	6	172	13,962	35	26	3,022	5	5	17,233
	Pounds	90	3,268	460,746	1,470	1,430	217,584	550	1,660	686,798
Pipe cut off and abandoned		956	910	211			270			2,347

		20	30	36	48	Total in Feet and Pounds.
New pipe or feet added.	Serv					109,159
	Supp	3,516	22,926	4,574	9,545	57,516
	Pum	7,953		2,162		15,186
	Fire					2,799
	Serv					78
	Supp	41				1,120
	Pum		165			165
	Bye					191
	Fire					6,499
	Fire					1,047
	Supp					632
	Mot					47
	Dra					1,739
		11,510	23,091	6,736	9,545	196,178
		1,830,090	7,666,212	2,842,592	5,553,825	24,597,147
Pipe used, but adding nothing to feet in ground.	P				246	32,282
	R 10	22	25	35	129	3,643
	Pi				143	25,068
	Pi		96		317	1,984
	Pi					658
	Pi					580
	10	22	121	35	835	64,215
	400	3,498	40,172	14,770	488,475	2,513,181
Total	10	11,532	23,212	6,771	10,380	260,393
	400	1,833,588	7,706,384	2,857,362	6,072,300	27,110,328
Pipe cut					1,119	9,259

Total Feet of Pipe in Use December 31, 1900.

Size in inches.	Total in use Dec. 31, 1899.	Extensions and Relays during 1900.			Deductions during 1900.			Total in use Dec. 31, 1900.
		Laid.	Relaid.	Total.	Taken up.	Abandoned.	Total.	
1	175	.....	.....	.....	.....	.....	.....	175
1½	3,566	.....	.....	.....	.....	.....	.....	3,566
2	3,855	.....	.....	.....	.....	.....	.....	3,855
3	87,616	330	.....	330	2,884	2,611	5,495	82,451
4	230,447	700	.....	700	17,820	2,677	20,497	210,650
6	4,745,431	86,722	27,422	114,144	3,844	2,540	6,384	4,853,191
8	234,353	6,088	17	6,105	150	42	192	240,266
10	379,670	26,466	3,406	29,872	.....	.....	.....	409,542
12	399,334	17,523	1,191	18,714	227	270	497	417,551
16	114,700	7,467	.....	7,467	.....	.....	.....	122,167
18	16,085	.....	.....	.....	.....	.....	.....	16,085
20	216,342	11,510	.....	11,510	.....	.....	.....	227,852
22	606	.....	.....	.....	.....	.....	.....	606
23	27	.....	.....	.....	.....	.....	.....	27
24	2,696	.....	.....	.....	.....	.....	.....	2,696
30	210,158	23,091	.....	23,091	.....	.....	.....	233,249
36	74,892	6,736	.....	6,736	.....	.....	.....	81,628
48	152,840	9,545	246	9,791	143	1,119	1,262	161,369
Total	6,872,793	196,178	32,282	228,460	25,068	9,259	34,327	7,066,926

BROKEN MAINS.

Breaks for which no Special Reason could be assigned Occurred in the following Districts:

Districts.	Size in Inches.											Total.
	3	4	6	8	10	12	16	20	30	36	48	
First	1	....	3	....	....	....	....	1	....	....	....	5
Second	1	1	7	1	1	1	....	1	....	....	....	13
Third	....	1	....	....	....	1	....	1	....	....	1	4
Fourth	....	1	20	....	2	....	....	....	1	1	....	25
Fifth	....	1	2	....	....	....	....	....	....	....	....	3
Sixth	1	....	7	....	2	1	1	....	2	....	....	14
Total	3	4	39	1	5	3	1	3	3	1	1	64

The following-named breaks were caused by sewer contractors and street cleaners, in their rough usage of fire hydrants, and by water freezing in the pipes, and various other causes:

Districts.	Size in Inches.								Total.
	3	4	6	8	10	12	16	48	
First	1	.....	5	.....	.....	.....	.....	.....	6
Second	.....	.....	6	1	.....	.....	.....	.....	7
Third	.....	3	18	1	1	1	.....	.....	24
Fourth	.....	.....	9	.....	.....	.....	1	.....	10
Fifth	2	3	6	.....	1	.....	.....	3	15
Sixth	.....	1	11	.....	.....	4	.....	.....	16
Total	3	7	55	2	2	5	1	3	78

Recapitulation of Fire Hydrants, Set, Renewed and Removed.

	Districts.	Style.				Total.
		O. S.	No. 1.	No. 2.	No. 3.	
Set.	First	.....	45	2	.....	47
	Second	.....	85	29	2	116
	Third	.....	157	14	.....	171
	Fourth	.....	59	55	.....	114
	Fifth	.....	33	.....	.....	33
	Sixth	.....	58	8	.....	61
	Total	.....	437	103	2	542
Renewed.	First	.....	4	.....	.....	4
	Second	.....	54	41	.....	95
	Third	.....	17	3	.....	20
	Fourth	.....	5	5	.....	10
	Fifth	.....	25	.....	.....	25
	Sixth	.....	124	10	.....	134
	Total	.....	229	59	.....	288
	Total new hydrants	.....	666	162	2	830
Removed.	First	2	4	3	1	10
	Second	9	4	3	3	19
	Third	2	7	7	7	23
	Fourth	9	4	4	5	22
	Fifth	2	2	1	.....	5
	Sixth	6	4	1	2	13
	Total	30	25	19	18	92
	Total added during 1900	.....	.....	.....	.....	450

Fire Hydrants by Wards.

Wards.	Style.						Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	
First	4	197	67	8	.....	.....	276
Second	3	118	92	15	.....	.....	228
Third	4	73	43	6	.....	.....	126
Fourth	1	62	32	14	.....	.....	109
Fifth	18	101	57	9	.....	.....	185
Sixth	9	76	43	11	.....	.....	139
Seventh	8	140	84	7	.....	1	240
Eighth	11	110	98	6	.....	1	226
Ninth	.....	127	72	5	.....	1	205
Tenth	.....	109	68	1	.....	4	182
Eleventh	6	73	26	1	.....	.....	106
Twelfth	7	61	28	5	.....	.....	101
Thirteenth	29	56	68	9	.....	.....	162
Fourteenth	.....	83	88	.....	.....	.....	171
Fifteenth	.....	226	206	8	1	2	443
Sixteenth	2	84	39	2	1	.....	128
Seventeenth	12	80	32	.....	.....	.....	124
Eighteenth	13	163	62	5	.....	.....	243
Nineteenth	34	316	122	.....	.....	.....	472
Twentieth	24	124	132	.....	.....	.....	280
Twenty-first	88	248	71	3	.....	.....	410
Twenty-second	86	1,024	215	27	.....	.....	1,352
Twenty-third	38	292	79	1	.....	.....	410
Twenty-fourth	62	260	141	16	.....	.....	479
Twenty-fifth	9	451	132	.....	.....	.....	592
Twenty-sixth	2	211	123	14	.....	.....	350
Twenty-seventh	41	291	92	5	.....	1	430
Twenty-eighth	1	137	129	21	.....	.....	288
Twenty-ninth	26	182	180	11	.....	1	400
Thirtieth	6	112	112	6	.....	.....	236
Thirty-first	.....	209	68	6	.....	.....	283
Thirty-second	11	123	86	10	.....	1	231

Fire Hydrants by Wards—Continued.

Wards.	Style.						Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	
Thirty-third	24	552	180	16	1	.....	773
Thirty-fourth	31	425	77	11	.....	1	545
Thirty-fifth	.....	62	6	.....	.....	.....	68
Thirty-sixth	12	248	101	29	.....	.....	390
Thirty-seventh	5	88	80	6	.....	.....	179
Thirty-eighth	18	338	102	7	.....	.....	465
Thirty-ninth	1	197	90	7	.....	.....	295
Fortieth	7	188	41	2	.....	.....	238
Forty-first	.....	53	7	.....	.....	.....	60
Total	653	8,070	3,571	310	3	13	12,620

Statement of the Number of Fire Hydrants by Districts and Wards, during 1900, and Total Previous Thereto.

First District.

	Wards. 1	2	3	4	26	30	36	39	Total.
Prior to 1900									2,014
During 1900	1	6	..	..	10	1	24	5	47
Total									2,061
Taken out, 1900	2	4	..	..	2	..	1	1	10
Total in City									2,051

Second District.

	Wards. 5	6	7	8	9	10	24	27	34	40	Total.
Prior to 1900											2,739
During 1900	3	2	8	6	1	3	22	16	40	15	116
Total											2,855
Taken out, 1900	3	1	1	3	..	..	6	1	4	..	19
Total in City											2,836

Third District.

	Wards. 11	12	16	17	18	19	22	23	25	31	33	35	41	Total.
Prior to 1900														3,108
During 1900	5	1	7	3	9	12	11	4	27	7	45	37	3	171
Total														3,279
Taken out, 1900	1	1	2	1	2	4	..	..	3	1	8	..	..	23
Total in City														3,256

Fourth District.

	Wards. 13	14	15	20	28	29	32	37	38	Total.
Prior to 1900										2,167
During 1900	10	2	51	13	11	4	3	7	13	114
Total										2,281
Taken out, 1900	..	..	8	6	2	3	1	1	1	22
Total in City										2,259

Fifth District and **Sixth District**, with grand totals.

	Fifth District. Wds 21	38	Total.	Sixth District. Wards. 22	33	37	38	Total.	Total.
Prior to 1900	..	..	467	..	..	..	..	1,675	12,170
During 1900	29	4	33	46	8	1	6	61	542
Total	..	..	500	..	..	..	..	1,736	12,712
Taken out, 1900	5	..	5	9	1	1	2	13	92
Total in City	..	..	495	..	..	..	..	1,723	12,620

Number of attachments for fire purposes previously reported 667

Made during 1900....	First District	3
	Second District	32
	Third District	8
	Fourth District	5
	Fifth District	—
	Sixth District	1
Total		716

Fire Hydrants by Purveyors' Districts.

Districts.	Style.						Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	
First	30	1,228	691	102	.....	.....	2,051
Second	181	1,826	744	76	.....	9	2,836
Third	147	2,321	755	31	2	.....	3,256
Fourth	103	1,084	1,011	56	1	4	2,259
Fifth	90	328	73	4	.....	.....	495
Sixth	102	1,283	297	41	.....	.....	1,723
Total	653	8,070	3,571	310	3	13	12,620

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

Districts.	NEW ATTACHMENTS.											SHUT OFF BY PERMIT.							WORK DONE WITHOUT PERMIT.				
	Size.														Repairs.				Drawn.				
	½-inch.	⅝-inch.	¾-inch.	1-inch.	1¼-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Reamed for Larger Attachments.	Re-driven.	Discontinued.	Transfer.	Not Drawn.	Drawn and Re-driven.	Total.	Discontinued and Abandoned.	Delinquent.	Leak.	Total.	Drawn and Re-driven.
First	620	12	10	14	1	4	5	1	2	1	670	.....	195	27	.....	....	20	242	9	....	151	160	
Second	1,626	147	28	24	4	13	19	....	....	....	1,861	75	80	143	8	....	53	359	22	....	104	126	260
Third	1,318	32	18	39	1	14	27	4	5	7	1,465	.....	45	61	4	39	1	150	152	2	163	317	567
Fourth	464	17	7	9	3	5	15	5	5	5	535	38	117	2	1	6	76	240	48	20	118	186	403
Fifth	137	19	3	6	....	....	4	....	....	....	169	.....	15	6	4	8	8	41	.....	1	.....	1	29
Sixth	377	44	11	9	2	....	3	....	2	....	448	8	57	36	43	7	.....	151	4	....	.....	4	
Total	4,542	271	77	101	11	36	73	10	14	13	5,148	121	509	275	60	60	158	1,183	235	23	536	794	1,259

Permits Issued During the Year 1900.

Aquaria	1
Bakeries	34
Barber shops	169
Bars	35
Basins and sinks in dwellings	5,687
Basins and sinks in offices and stores	1,435
Baths in dwellings	6,070
Baths in hotels, etc.	21
Baths, shower	15
Bidets	3
Boats, etc., supply of	131
Bottling establishments	16
Building purposes	241
Carriages and wagons	291
Cellar drainers	32
Dwellings, half	114
Drug stores	28
Dye houses	3
Factories	8
Ferrules, number	5,079
Filters	4
Fire hydrants, for use of	127
Fish troughs and stands	3
Forges	15
Fountains, counter	23
Fountains, garden	8
Green houses	72
Heating boilers	89
Hydrants in new buildings	4,677
Hydraulic elevators	8
ce cream saloons	8
Lawn sprinklers	14
Laundries	76
Laboratories	2
Machines for scouring and rinsing	22
Milk houses	47
Motors, beer	39
Motors, organ	15
Photograph galleries	5
Pantry sinks	477
Pools, swimming	3
Pools in churches	3
Restaurants and eating saloons	91
Slaughter houses	6
Stables	97
Stalls in stables	1,717
Stalls, cow	45
Steam boilers, number	342
Steam boilers, horse power	11,348
Steam engines, number	123
Steam engines, horse power	527
Street sprinklers	84
Tubs, vats and tanks	65
Urinals in dwellings	31
Urinals in stores, offices, etc.	167
Urinal troughs	60
Washpaves and screw nozzles	3,144
Washpaves for watering horses	38
Wash tubs, stationary	3,443
Water closets in dwellings	15,491
Water closets in stores, etc.	1,347

Premises Supplied and Appliances in Use January 1, 1901.

Aquaria	9	Factories, foundries and mills	1,804
Arsenals	2	Filters	18
Asylums	7	Fire stations	47
Bakeries	1,064	Fountains, garden	41
Barber shops	1,611	Fountains, counter	499
Bars	1,712	Forges	1,128
Basins and sinks in dwellings	69,970	Furnaces	28
Basins and sinks in offices and stores	27,282	Gas works and holders	8
Baths in dwelling	271,882	Glass works	14
Baths, public	1,225	Greenhouses	1,041
Baths, shower	264	Grindstones	144
Baths, foot	106	Halls and club-houses	218
Beam houses and tanneries	27	Hatters' planks, per set	16
Bidets	429	Hydrants	248,289
Bottling establishments	630	Hospitals	48
Brick yards	17	Hotels	56
Brick yards, gangs of men	78	Hydraulic elevators	235
Breweries	93	Ice cream saloons	289
Barrels brewed	2,342,621	Institutions, charitable	85
Cars, steam and electric	1,368	Ice machines	147
Carriages and wagons	8,876	Laundries	757
Cellar drainers	38	Lawn sprinklers	276
Cemeteries	24	Laboratories	36
Churches	514	Machines for washing, scouring, etc	2,604
Coal yards	241	Marble yards	76
Coloring rooms	164	Malt houses	18
Condensers	15	Market houses	71
Depots and railroad stations	103	Milk houses	307
Dwellings with water	237,011	Mints	2
Dwellings without water	3,014	Motors, beer	1,734
Dwellings half without water	9,453	Motors, organ	119
Dyers	736	Photograph galleries	128
Drug stores	360	Photograph galleries, operators	169
Dye houses	639	Police stations and patrols	47
Engines on railroads	293		

Premises Supplied and Appliances in Use—Continued.

Polishing wheels	23	Steam engines, number	1,980
Pools, swimming	21	Steam engines, horse power	33,342
Pools in churches	80	Steam saws	61
Printing establishments	171	Steam presses and hammers	65
Prisons	4	Shops and stores with water	5,768
Rectifying establishments	8	Shops without water	947
Restaurants and oyster saloons	1,030	School houses	328
Shot tower	1	Theatres	18
Slaughter houses	460	Tubs, vats and tanks	2,167
Soap boiling establishments	18	Turbine wheels	35
Stand pipes for watering engines	33	Urinals in dwellings	202
Stables	7,560	Urinals in stores, offices, etc.	4,442
Stalls in stables	50,931	Urinal troughs	605
Stalls, cow	141	Vinegar establishments	10
Stalls, fish and trough	93	Wash paves and screw nozzles	93,739
Steam boilers, number	3,449	Wash paves for watering horses	607
Steam boilers, horse power	113,295	Wash tubs, stationary	29,602
Steam boilers, heating, number	849	Water closets in dwellings	206,890
Steam boilers, heating, horse power	5,508	Water closets in stores, etc.	25,567
		Wool washers	98

TABLE "A."

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

Districts.	Number of Connections.				Total.	Length in Feet.				Total.
	½-Inch.	⅝-Inch.	¾-Inch.	1½-Inch.		½-Inch.	⅝-Inch.	¾-Inch.	1½-Inch.	
First	901	....	....	....	901	9,398	....	....	....	9,398
Second	1,048	....	1	....	1,049	19,644	....	12	....	19,656
Third	1,876	....	....	1	1,877	27,465	....	....	20	27,485
Fourth	294	....	....	....	294	3,593	....	....	....	3,593
Fifth	253	....	....	....	253	3,768	....	....	....	3,768
Sixth	294	25	....	....	319	4,341	415	....	....	4,756
Total	4,666	25	1	1	4,693	68,209	415	12	20	68,656

Account of Iron Stop Boxes, New Stops and Check Valves for 1900.

Districts.	Iron Stop Boxes.	Bureau of Water.		Viney.	Smith's Patent.	Check Valves.	Total.
		2-way.	Butterfly.	3-way.			
First	.....	82	.....	.....	1	.....	83
Second	140	282	4	.....	25	.....	311
Third	44	287	10	1	9	.....	307
Fourth	138	163	.....	8	2	.....	173
Fifth	.....	32	1	.....	.....	4	37
Sixth	29	93	.....	.....	.....	.....	93
Total	351	939	15	9	37	4	1,004

Repairs to Mains, Stops and Fire Hydrants, also Stops and Fire Hydrants Removed during 1900.

Districts.	Repairs to Mains.	Stops.			Fire Hydrants.		
		Repaired.	Renewed.	Removed.	Repaired.	Renewed.	Removed.
First	34	69	12	.....	54	4	10
Second	208	351	23	9	215	95	19
Third	201	238	65	1	227	20	23
Fourth	273	482	2	10	556	10	22
Fifth	94	25	10	3	140	25	5
Sixth	111	13	19	11	11	134	13
Total	921	1178	131	34	1203	288	92

Check Valves Put In.

Street.	Location.	Ward.	Size.
Eva (Ann)	53 feet 6 inches S. E. of S. E. house line of Shawmont avenue	21	36
Eva (Ann)	82 feet N. W. of N. W. house line of Shawmont avenue	21	36
River Road	69 feet S. E. of N. W. wall of Engine House	21	36
River Road	86 feet S. E. of N. W. Wall of Engine House	21	30

Total Number of Stops and Valves in the City Arranged by Districts.

Pattern.	Size.	Outlets.	Districts.						Total.
			1st.	2d.	3d.	4th.	5th.	6th.	
	3	2-way.	1	190	4	18	2	12	227
	4	2-way.	93	226	124	171	42	91	747
	6	2-way.	3589	4328	4263	3364	608	2219	18,371
	8	2-way.	141	370	109	100	7	71	798
	10	2-way.	207	316	289	302	28	160	1,302
	12	2-way.	102	352	273	156	47	191	1,121
Single Gate.	16	2-way.	38	50	51	22	2	39	202
Bureau of Water.	18	2-way.	.....	.....	5	.....	.....	1	6
	20	2-way.	24	49	16	46	14	16	165
	30	2-way.	8	11	29	38	12	3	101
	36	2-way.	3	4	8	12	11	.....	38
	48	2-way.	.....	.....	3	9	.....	.....	12
		Totals.....	4206	5896	5174	4238	773	2803	23,090
	20	2-way.	.....	5	5	9	3	2	24
	30	2-way.	2	5	3	9	8	1	28
Butterfly.	36	2-way.	.....	.....	2	17	1	.....	20
Bureau of Water.	48	2-way.	.....	1	5	27	20	.....	53
		Totals.....	2	11	15	62	32	3	125
	6	4-way.	4	16	.....	12	.....	.....	32
	8	4-way.	.....	.....	.....	5	.....	.....	5
Barton.	6	5-way.	12	32	.....	.....	.....	.....	44
	6	6-way.	.....	7	.....	.....	.....	.....	7
		Totals.....	16	55	.....	17	.....	.....	88

Total Number of Stops, Valves, etc.—Continued.

Pattern.	Size.	Outlets.	Districts. 1st.	2d.	3d.	4th.	5th.	6th.	Total.
Viney.	6	2-way.	7	.....	4	3	.....	.....	14
	6	3-way.	51	66	36	243	6	10	412
	8	3-way.	.....	5	.....	.....	.....	.....	5
	10	3-way.	.....	.....	.....	3	.....	.....	3
	12	3-way.	.....	2	.....	3	.....	.....	5
	6	4-way.	24	33	24	124	3	11	219
	8	4-way.	1	6	2	.....	.....	.....	9
	10	4-way.	.....	4	.....	14	.....	.....	18
	12	4-way.	.....	.....	.....	.....	.....	2	2
	6	5-way.	25	6	2	28	.....	.....	61
		Totals.....	108	122	68	418	9	23	748
Smith Patent.	3	2-way.	.....	19	.....	1	.....	.....	20
	4	2-way.	1	19	1	.....	.....	.....	21
	6	2-way.	.....	43	15	3	6	5	72
	8	2-way.	1	.....	7	.....	.....	.....	8
	10	2-way.	.....	.....	5	.....	.....	1	6
	12	2-way.	1	3	8	.....	.....	.....	12
	16	2-way.	4	.....	2	.....	.....	.....	6
	20	2-way.	.....	3	.....	.....	.....	.....	3
		Totals.....	7	87	38	4	6	6	148
Ludlow.	3	2-way.	.....	1	.....	.....	.....	.....	1
Total number of stops.....			4339	6172	5295	4739	820	2835	24,200
Check valves, Bureau of Water.	20	.....	.....	1	.....	.....	.....	.....	1
	30	.....	.....	.....	1	.....	3	.....	4
	36	.....	.....	1	.....	.....	4	.....	5
	48	.....	.....	.....	4	4	6	.....	14
		Totals.....	.....	2	5	4	13	.....	24

Number of Valves raised in the several Districts during the year 1900.

Districts.	Barton.			Viney.			Single Gate.									
	4-way.	5-way.	6-way.	3-way.	4-way.	5-way.	3-inch.	4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	30-inch.	48-inch.	Total.
First	....	....	....	....	....	....	....	....	13	....	....	3	....	....	....	16
Second	....	3	2	1	1	....	1	1	5	....	1	....	1	....	....	16
Third	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Fourth	....	....	....	2	4	1	....	1	20	1	....	....	....	2	1	32
Total	1	3	2	3	5	1	1	2	38	1	1	3	1	2	1	65

Number of Complaints and Examinations during 1899 and 1900.

Months.	Hydrants.		Service Pipes.		Wash Paves.		Spigots.		Water Closets.		Horse Troughs.		No. Leaks.		Total.	
	1899	1900	1899	1900	1899	1900	1899	1900	1899	1900	1899	1900	1899	1900	1899	1900
January	113	251	146	227	6	13	4	7	37	79	1	2	13	19	320	598
February	95	146	231	166	10	11	5	5	27	56	1	.....	13	22	382	406
March	158	94	127	121	9	3	1	8	67	55	.....	3	8	6	370	290
April	100	150	66	120	12	3	5	9	33	83	1	2	7	10	224	377
May	158	159	106	104	8	6	13	15	62	92	4	3	5	12	356	391
June	184	188	87	96	6	4	8	13	101	89	.....	1	5	14	391	405
July	117	172	101	109	7	10	6	7	40	66	.....	1	8	7	279	372
August	164	157	111	79	3	3	11	21	83	72	1	1	22	4	395	337
September	142	158	115	86	5	3	10	9	61	63	1	.....	9	11	343	330
October	218	265	143	123	6	7	11	17	104	109	1	2	6	11	489	534
November	188	238	116	95	6	1	9	17	95	94	1	1	9	17	424	463
December	194	229	135	143	7	9	11	12	69	83	.....	4	8	13	424	493
Total	1,831	2,207	1,484	1,469	85	73	94	140	779	941	11	20	113	146	4,397	4,996

NEW METERS SET.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
4	Gallaher, Harry.....	743-45 S. Front street.....	Store-house, etc.....	Mar. 20..	Crown.....		1							1	51,900	
5	Stilwell, A.....	323 S. Lawrence street.....	Last Manufacturer..	Feb. 3..	Crown.....		1							1	328	
5	Ellis, Jos. D. & Co....	211 S. American street.....	Soap Mfrs.....	Feb. 5..	Gem.....					1				1	26,500	
6	Restein, Clement & Co.	127 N. Second street.....	Freight Depot.....	Feb. 8..	Crown.....		1							1	20,220	
6	Butcher, W., Est....	146-48 N. Front street.....	Packing Mfr.....	Mar. 10..	Crown.....					1				1	27,900	
6	Megargee Estate....	27 and 29 S. Seventh street.....	Storage, etc.....	May 31..	Crown.....				1					1	7,300	
6	Megargee Estate....	27 and 29 S. Seventh street.....	Printing Estab'm't..	June 17..	Nash.....		1							1	40,400	
6	Moore, Alfred T.....	200-12 N. 3d, N. W. cor. Race street...	Printing Estab'm't..	June 17..	Nash.....		1							1	15,300	
6	Moore, Alfred T.....	200-12 N. 3d, N. W. cor. Race street....	Wire and Elec. Sup..	Oct. 12..	Gem.....						1			1	9,400	
7	Kolischer, T.....	W. S. 27th, 120 feet N. of South street..	Wire and Elec. Sup...	Oct. 12..	Crown.....					1				1	42,800	
8	Real Est. Trust Co...	S. E. cor. Chestnut and Broad streets...	Ice Manufacturer....	Mar. 8..	Gem.....							1		1	2,723,200	
8	Harrison, C. C.....	919-21 Walnut street.....	Office Building.....	Feb. 19..	Gem.....							1		1	1,203,100	
9	United Gas Imp. Co..	Filbert, S. W. cor. 22d street.....	Office Building.....	Mar. 27..	Crown.....		1							1	162	
9	Penna. Railroad Co..	2023-35 Filbert street.....	Gas Office.....	Mar. 1..	Crown.....			1						1	67,500	
			Office & Standpipes..	Mar. 13..	Crown.....		1							1	196,900	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
9	Penna. Railroad Co..	2023-35 Filbert street.....	Office & Standpipes..	Mar. 14..	Crown..	....	1	....	....	....	....	....	....	1	8,400	
9	Girard Estate.....	23 S. Eleventh street.....	Bath House.....	Mar. 19..	Crown..	....	....	....	....	1	....	....	....	1	80,164	
9	Bell Telephone Co....	1701-05 Filbert street.....	Office Building.....	April 25..	Gem....	....	....	....	....	....	....	1	....	1	900	
9	Bell Telephone Co....	1701-05 Filbert street.....	Office Building.....	April 26..	Torrent	....	....	....	....	....	1	....	....	1	581,400	
9	U. S. Post Office.....	S. W. cor. 9th and Market to Chestnut. .	Post Office.....	Sept. 2...	Stan'd .	....	....	....	....	....	....	....	1	1	1,849,200	
10	Finnegan, Owen.....	219 N. Eighth street.....	Shoe Manufacturer..	Feb. 5...	Crown..	....	....	1	....	....	....	....	....	1	63,700	
10	Finnegan, Owen.....	219 N. Eighth street.....	Shoe manufacturer..	Feb. 5...	Crown..	....	1	....	....	....	....	....	....	1	20,000	
10	Lea, H. C.....	701-05 Arch street.....	Mach'y and various..	Feb. 21..	Gem....	....	....	....	....	1	....	....	....	1	126,800	
10	Hulshizer, A. H.....	254 N. Ninth street.....	Bath House.....	Mar. 29..	Crown..	....	....	....	1	....	....	....	....	1	46,000	
12	Weber, F.....	405-09 Wood street.....	Chemicals, etc.....	Feb. 6...	Crown..	....	....	1	....	....	....	....	....	1	42,400	
12	Weber, F.....	405-09 Wood street.....	Chemicals, etc.....	Feb. 6...	Crown..	....	1	....	....	....	....	....	....	1	49,400	
12	Dwyer, Michael.....	424 N. Orianna street.....	Paints, etc.....	Aug. 28..	Gem....	....	....	....	....	....	1	....	....	1	201,400	
13	Kingan Provision Co.	N. E. cor. Eighth and Callowhill sts.....	Provision Dealers...	Mar. 9...	Gem....	....	....	....	....	....	....	1	....	1	378,800	
13	Kingan Provision Co.	N. E. cor. Eighth and Callowhill sts.....	Provision Dealers...	Mar. 20..	Crown..	....	1	....	....	....	....	....	....	1	24,000	
14	Phila. Towel Supply & Laundry Co.....	1029 and 31 Vine street.....	Laundry.....	June 7...	Gem....	....	....	....	....	....	....	1	....	1	556,500	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
15	Sellers, Wm. & Co....	Hamilton street, N. W. cor. 16th to N. E. cor. 17th.....	Machine shop.....	April 29..	Torrent.....							1		1	206,600	
16	Marshall Bros.....	24 Girard av., S. W. cor. Leopard st.....	Store-house	Feb. 17..	Crown.....		1							1	19,800	
16	Frank, Louis H. Ex..	1116-20 Bodine street.....	Mill.....	April 26..	Crown.....					1				1	100,000	
17	Johnson, Jos., Estate	N. W. cor. Jefferson and Mascher sts....	Iron Bed Mfr.....	Jan. 13...	Crown.....				1					1	126,100	
18	Williamson Bros	S. W. cor. Edgemont and Cumberland...	Boiler Foundry.....	Feb. 1...	Crown.....				1					1	278,000	
18	River Front Railroad	340 Allen street.....	Freight Office.....	Feb. 16...	Crown.....			1						1	35,900	
18	River Front Railroad	2741 E. Norris street.....	Freight Office.....	Mar. 15...	Crown.....			1						1	113,500	
18	River Front Railroad	E. S. Beach, 345 feet S. of Shackamaxon.	Freight Office and Yd.	April 1...	Crown.....					1				1	66,900	
18	Weber, Louis.....	406-12 Memphis street.....	Chemicals.....	May 4...	Crown.....				1					1	67,800	
18	Neafie & Levy.....	1365 Beach, N. E. cor. Palmer street.....	Machine Shop.....	Jan. 29...	Crown.....					1				1	470,400	
19	Manor Real Est. Co.	1706-12 Frankford avenue	Furniture, etc.....	March 12.	Crown		1							1	25,300	
19	Sheip, H., Mfg. Co...	1708-10 N. Randolph street	Box Manufacturers..	March 31.	Gem							1		1	1,142,000	
19	Sheip, H., Mfg. Co...	529-35 Columbia avenue	Box Mfrs. and Office.	June 13..	Crown		1							1	70,000	
19	Farkish, Julius.....	2520 Fairhill street	Bath House.....	June 18..	Crown				1					1	5,100	
19	McCaffrey File Co....	1841 N. Fifth street	File Mfrs.....	July 31..	Crown					1				1	341,508	

New Meters Set—Continued.

Wards.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
19	Summers, S.Lewis ..	309 Susquehanna avenue	Private House.....	Aug. 2...	Crown			1						1	8,200	
19	Kensington Sunday S.	313-15 Susquehanna avenue	School House.....	Oct. 22..	Pittsb'g		1							1	126,800	
19	Buckley, Jas. E.....	S. W. cor. Waterloo and York streets ...	Silk, etc.....	Nov. 19..	W'rth'n				1					1	22,600	
20	Peele, Edward.....	1316 Girard avenue	Laundry	Feb. 2...	Crown		1							1	3,300	
20	Peele, Edward.....	1316 Girard avenue	Photograph Gallery..	Feb. 5...	Crown		1							1	6,700	
20	Shoemaker, Saml....	N. W. cor. 10th and Montgomery ave....	Market House.....	Mar. 23..	Crown			1						1	414,600	
20	Shoemaker, Saml....	N. W. cor. 10th and Montgomery ave....	Market House.....	Mar. 27..	Crown				1					1	610,345	
20	Shoemaker, Saml....	1802-32 N. Tenth street	Hall, Store-house, etc.	April 2...	Crown		1							1	51,880	
20	Shoemaker, Saml....	1802-32 N. Tenth street	Hall, Store-house, etc.	April 2...	Crown		1							1	3,100	
20	Shoemaker, Saml....	1802-32 N. Tenth street	Hall, Store-house, etc.	April 13..	Crown		1							1	2,900	
20	Shoemaker, Saml....	N. W. cor. 10th and Montgomery ave....	Factory.....	April 14..	Crown		1							1	258,790	
20	Shoemaker, Saml....	1802-32 N. Tenth street.....	Factory	April 16..	Crown		1							1	151,216	
20	Shoemaker, Saml....	1802-32 N. Tenth street.....	Blacksmith Shop....	April 20..	Crown		1							1	2,800	
20	Shoemaker, Saml....	1839-43 Warnock street.....	Stable & Smith Shop	April 23..	Crown		1							1	33,773	
21	Lupton, Oliver & Co..	High st , S. E. cor. Leverington ave.....	Woolen Mfrs.....	Mar. 21..	Crown				1					1	692,600	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
15	Sellers, Wm. & Co....	Hamilton street, N. W. cor. 16th to N. E. cor. 17th.....	Machine shop.....	April 29..	Torrent	....	....	....	....	....	....	1	....	1	206,600	
16	Marshall Bros.....	24 Girard av., S. W. cor. Leopard st.....	Store-house	Feb. 17..	Crown	....	1	....	....	....	....	....	....	1	19,800	
16	Frank, Louis H. Ex..	1116-20 Bodine street.....	Mill.....	April 26..	Crown	....	....	....	....	1	....	....	....	1	100,000	
17	Johnson, Jos., Estate	N. W. cor. Jefferson and Mascher sts....	Iron Bed Mfr.....	Jan. 13...	Crown	....	....	....	1	....	....	....	....	1	126,100	
18	Williamson Bros	S. W. cor. Edgemont and Cumberland...	Boiler Foundry.....	Feb. 1...	Crown	....	....	....	1	....	....	....	....	1	278,000	
18	River Front Railroad	340 Allen street.....	Freight Office.....	Feb. 16...	Crown	....	....	1	....	....	....	....	....	1	35,900	
18	River Front Railroad	2741 E. Norris street.....	Freight Office.....	Mar. 15...	Crown	....	....	1	....	....	....	....	....	1	113,500	
18	River Front Railroad	E. S. Beach, 345 feet S. of Shackamaxon.	Freight Office and Yd.	April 1...	Crown	....	....	....	....	1	....	....	....	1	66,900	
18	Weber, Louis.....	406-12 Memphis street.....	Chemicals.....	May 4...	Crown	....	....	....	1	....	....	....	....	1	67,800	
18	Neafie & Levy.....	1365 Beach, N. E. cor. Palmer street.....	Machine Shop.....	Jan. 29...	Crown	....	....	....	....	1	....	....	....	1	470,400	
19	Manor Real Est. Co.	1706-12 Frankford avenue	Furniture, etc.....	March 12.	Crown	....	1	....	....	....	....	....	....	1	25,300	
19	Sheip, H., Mfg. Co...	1708-10 N. Randolph street	Box Manufacturers..	March 31.	Gem	....	....	....	....	....	....	1	....	1	1,142,000	
19	Sheip, H., Mfg. Co...	529-35 Columbia avenue	Box Mfrs. and Office.	June 13..	Crown	....	1	....	....	....	....	....	....	1	70,000	
19	Farkish, Julius.....	2520 Fairhill street	Bath House.....	June 18..	Crown	....	....	....	1	....	....	....	....	1	5,100	
19	McCaffrey File Co....	1841 N. Fifth street	File Mfrs.....	July 31..	Crown	....	....	....	....	1	....	....	....	1	341,508	

New Meters Set—Continued.

Wards.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
19	Summers, S. Lewis ..	309 Susquehanna avenue	Private House.....	Aug. 2...	Crown			1						1	8,200	
19	Kensington Sunday S.	313-15 Susquehanna avenue	School House.....	Oct. 22..	Pittsb'g		1							1	126,800	
19	Buckley, Jas. E.....	S. W. cor. Waterloo and York streets ...	Silk, etc.....	Nov. 19..	W'rth'n				1					1	22,600	
20	Peele, Edward.....	1316 Girard avenue	Laundry	Feb. 2...	Crown		1							1	3,300	
20	Peele, Edward.....	1316 Girard avenue	Photograph Gallery..	Feb. 5...	Crown		1							1	6,700	
20	Shoemaker, Saml....	N. W. cor. 10th and Montgomery ave....	Market House.....	Mar. 23..	Crown			1						1	414,600	
20	Shoemaker, Saml....	N. W. cor. 10th and Montgomery ave....	Market House.....	Mar. 27..	Crown				1					1	610,345	
20	Shoemaker, Saml....	1802-32 N. Tenth street	Hall, Store-house, etc.	April 2...	Crown		1							1	51,880	
20	Shoemaker, Saml....	1802-32 N. Tenth street	Hall, Store-house, etc.	April 2...	Crown		1							1	3,100	
20	Shoemaker, Saml....	1802-32 N. Tenth street	Hall, Store-house, etc.	April 13..	Crown		1							1	2,900	
20	Shoemaker, Saml. ..	N. W. cor. 10th and Montgomery ave....	Factory.....	April 14..	Crown		1							1	258,790	
20	Shoemaker, Saml....	1802-32 N. Tenth street.....	Factory	April 16..	Crown		1							1	151,216	
20	Shoemaker, Saml....	1802-32 N. Tenth street.....	Blacksmith Shop....	April 20..	Crown		1							1	2,800	
20	Shoemaker, Saml....	1839-43 Warnock street.....	Stable & Smith Shop	April 23..	Crown		1							1	33,773	
21	Lupton, Oliver & Co..	High st, S. E. cor. Leverington ave.....	Woolen Mfrs.....	Mar. 21..	Crown				1					1	692,600	

New Meters Set—Continued.

Ward.	Occupation.	Location.	Business.	Date When Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet Consumed.	Remarks.
21	Keeley, O. S.....	4370-72 Main street.....	Mill Supplies.....	Mar. 21..	Crown.....		1							1	2,000	
21	Foster Bros.....	4364-66 Main street.....	Department Store...	June 20..	Crown.....		1							1	39,600	
21	Phil'a. Paper Mfg. Co.	W. S. Nixon, 6th prop. N. of Fountain..	Paper Mfrs.....	June 27..	Crown.	1								1	100	
21	McFadden, Wm	3824-28 Terrace street.....	Livery Stable.....	July 5...	Trident.....					1				1	800	Fire connection.
21	McFadden, Wm.....	3824-28 Terrace street.....	Laundry.....	July 6...	Crown.....		1							1	23,000	
21	Wostenholme & Clark	N. E. cor. High and Mallory streets.....	Cotton Mfrs.....	July 9...	Crown.....		1							1	54,700	
21	Pencoyd Club.....	E. S. Manayunk av., 1st N. of Kalos....	Club House.....	Aug. 9...	Gem.....					1				1	10,900	
22	Phila. Cricket Club..	N. S. Willow Grove av., 300 feet W. of Thirty-first street.....	Club House, etc.....	May 1...	Crown.....					1				1	204,800	
22	Phila. Cricket Club..	N. S. Willow Grove av., 300 feet W. of Thirty-first street.....	Club House, etc.....	May 2...	Crown.....		1							1	12,800	
22	Ballantyne, J.....	Rear of 278 Ashmead street.....	Woolen Mfrs.....	May 10..	Gem.....					1				1	5,600	Place shut down.
22	Phila. Cricket Club..	N. S. Willow Grove av., 300 feet W. of Thirty-first street.....	Club House, etc.....	May 15..	Crown.....					1				1	400	
22	Waters, Danl. F.....	47 to 53 Wister street.....	Dye House.....	June 26..	Crown.....					1				1	73,900	
22	Meighan, John.....	6554 and rear Germantown avenue.....		July 13..	Crown.....				1					1	28,600	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date When Set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic Feet Consumed.	Remarks.
22	McCallum & Sloan	Wayne st., 1st mill S. of Berkley street	Carpet Mfrs	Nov. 29	Stan'd							1		1	420	
22	McCallum & Sloan	Wayne st., 1st mill S. of Berkley street	Carpet Mfrs	Nov. 29	Stan'd								1	1	30,300	
23	Dean & Crocker	2009-11 Oxford street	Machine Shop	Feb. 8	Crown		1							1	25,100	
23	Corson, R. T.	4629-31 Frankford av	Office Bldg. and Hall	Feb. 8	Crown		1							1	2,000	
23	Whittaker, W. & Sons	S. W. cor. Adams av. and Wingohocking	Woolen Mfrs	Feb. 13	Crown				1					1	21,700	
23	Whittaker, W. & Sons	S. W. cor. Adams av. and Wingohocking	Woolen Mfrs	Feb. 13	Crown		1							1	2,700	
23	Thorpe, Richard	1657 Wilmot street	Woolen Mill	Feb. 28	Crown				1					1	5,700	
23	Holden, W. Howard	4328 Orchard street	Mill	May 29	Crown				1					1	8,000	
23	Coates, E.	E. S. Orchard, 172 feet S. E. of Tacony	Mill	July 10	Crown			1						1	7,000	
23	Walker, Thos. & Sons	Rear 4617 Tacony street	Machine Shop	Sept. 13	Stand'd		1							1	17,270	
23	Sidebottom, Jno., Agt	4178 Salem street	Woolen Mill	Oct. 23	Gem						1			1	139,900	
24	Little, J. Kay	S. E. cor. 39th and Spring Garden sts	Club House	March 16	Crown		1							1	63,000	
24	Parkside Ap. House	4000 Parkside av., S. W. cor. 40th st	Hotel	May 2	Gem					1				1	353,700	
24	Union Traction Co	S. W. cor. Lancaster av. and 43d street	Car Depot	July 11	Crown				1					1	81,200	
25	Sidebottom, S., Estate	3948 Frankford avenue	Tannery	March 16	Crown		1							1		Min. charge, Vacant.

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size							Total.	Cubic feet consumed.	Remarks.
						½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
25	Bill, J. R. & Co.	1824 E. Clearfield street	Hosiery Mfrs.	June 18.	Crown.		1							1	18,000	
25	Merchants' Ice Co.	3085 Helen street	Ice Mfrs.	July 31	Crown					1				1	505,000	
25	Whittaker, Henry	Emerald, S. E. cor. Westmoreland street	Worsted Mill	Aug. 4	Trident						1			1	148,700	
25	Textile Chemical Co.	S. W. cor. Tioga and Belgrade streets	Chemicals	Oct. 3	Trident		1							1	68	
27	Gray, Wm. & Sons	N. E. cor. 30th and Locust streets	Marble Yard	May 15	Crown			1						1	2,000	
27	Psi-Upsilon Frater'ty	300 feet S. 36th, S. W. cor. Locust street	Club House	June 6	Crown				1					1	10,100	
27	Croft & Allen	3233-49 Woodland avenue	Candy Mfrs.	Oct. 1	Gem						1			1	20,600	
28	Phila. Traction Co.	Ridge av., E. s., N. E. cor. Susq. av.	Car Depot	March 7	Crown					1				1	1,362,100	
28	Phila. Traction Co.	Ridge av., E. s., N. E. cor. Susq. ave	Car Depot	March 7	Crown		1							1	9,300	
28	Liberty Chem. Co.	2555 Sydenham street	Chemicals	July 25	Crown			1						1	5,400	
29	N. United Pr. Church	S. s. Master, W. of Fifteenth street	Church and Organ	Feb. 2	Crown				1					1	8,100	
29	Van Lee, Alice A.	N. E. cor. 20th and Oxford streets	Ice and Cold Storage	March 5	Crown				1					1	24,600	
29	Froemner, Henry	1402 N. Twenty-second street	Scale Mfr.	March 21	Crown		1							1	289,800	
29	Filter Plant	Spring Garden Station		May 11	Crown			1						1	37,425	
29	Malloch, John	2222 Master street	Chemicals	June 20	Crown		1							1	2,800	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks
30	Merchant & Co	2019-27 Washington avenue	Tin Plate	March 31.	Gem						1			1	116,200	
31	Liggett, Alex	2332 Letterly street	Laundry	Feb. 1	Crown		1							1	37,800	
33	Fairhill M. E. Ch	S. E. cor. 5th and Clearfield streets	Church and Organ	March 22.	Crown				1					1	5,300	
33	Halton's, Thos., Sons	N. E. cor. Allegheny ave. and "C" street	Mill	March 26.	Crown						1			1	183,200	
33	Mathieu, J. P. & Co.	10th s. of Ontario street	Leather Mfrs	April 17.	Crown				1					1	184,500	
33	Mathieu, J. P. & Co.	10th and Westmoreland streets	Leather Mfrs	May 7	Crown							1		1	1,247,900	
33	Mathieu, J. P. & Co.	Ontario, E. of 10th street	Leather Mfrs	June 12.	Crown				1					1	454,800	
33	Mathieu, J. P. & Co.	10th, N. of Westmoreland street	Leather Mfrs	June 14.	Crown				1					1	2,000	
33	American Mach. Co.	N. E. cor. Lehigh ave. and American st	Machine Shop	July 17.	Stan'd						1			1	42,100	
33	Mathieu, J. P. & Co.	N. s. Westmoreland, W. of 9th street	Leather Mfrs	Oct. 23.	Stan'd								1	1	1,797,000	
34	Hestonville Ice Mfg. Co	5166-70 Jefferson street	Ice Mfrs	June 20.	Gem							1		1	2,256,900	
34	Haverford Bldg. and Loan Assn	E. s. 62d, N. of Girard avenue	Tapestry Mfr	July 25.	Crown				1					1	4,500	
36	Richardson & Ross Asphalt Co	W. s. 37th, S. of Wharton street		April 27.	Crown					1				1	145,300	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
36	Alcatraz Paving Co..	W. s. Schuylkill ave., 200 feet S. Whar'n		May 21...	Crown					1				1	100,400	
36	Girard Estate	S. E. cor. 23d and Ritner streets	Furniture Mfr	June 5...	Crown						1			1	256,300	
36	Girard Estate	S. E. cor. 23d and Ritner streets	Furniture Mfr	June 14..	Gem							1		1	160	
36	Atlantic Ref. Co	Old W. Passyunk ave., cor. River road	Oil Works	Oct. 2....	Trident		1							1	1,600	
37	Crawford, Benj. T...	N. s. Glenwood, 56 feet E. of Park ave...	Biscuit Bakery	Feb. 7...	Gem							1		1	400,300	
38	Diamond Elec. Co...	S. W. cor. 17th and Clearfield streets	Electric Mfrs,	March 8..	Gem							1		1	1,315,500	
38	Amer. Card Clthg. Co.	S. E. cor. Bristol and Wayne streets	Mill Supplies	March 29.	Crown		1							1	400	Covers unused ferrule.
38	Ruffner, D. B.	N. E. cor. Bowman and Cresson streets..	Machine Shop	June 19..	Crown		1							1	25,800	
38	Elec. Stor. Bat. Co..	S. W. cor. 19th and Allegheny avenue....	Electric Mfrs	Oct. 19..	Gem						1			1	.....	Supply not connected.
39	United Gas Imp. Co..	9th, from Mifflin to Dudley street	Office and Stable....	July 9...	Crown					1				1	103,900	
39	B. & O. R. R. Co....	S. s. Snyder ave. and Ash street	Freight Office & Yard	Aug. 23..	Crown							1		1	33,300	
39	United Gas Imp. Co..	9th, S. E. cor. Mifflin to Dudley street....	Office and Stable....	Dec. 14..	Gem					1				1	7,700	
40	Callaghan, Albert....	S. W. cor. 60th st. and Baltimore ave....	Cotton Mills	Feb. 7...	Crown				1					1	.....	Never used — no connection.
40	P. W. & B. R. R. Co..	W. s. Island rd., 100 feet S. of Elmwood..	Round House	Feb. 16..	Crown				1					1	36,600	
	Total					2	43	13	22	22	11	14	8	136	26,819,129	

	Meters Tested.									
	Total.	Crown.	Gem.	Nash.	Trident.	Torrent.	Standard.	Empire.	Pittsburg.	Total.
½-inch	.....	1	.....	1	.....	.....	.....	.....	.....	2
⅜-inch										
¾-inch	6	105	.....	.....	8	.....	1	.....	4	118
1-inch	.....	65	.....	.....	.....	.....	.....	2	.....	67
1½-inch	6	53	.....	.....	5	.....	3	.....	1	62
2-inch	3	49	25	.....	3	.....	1	.....	1	79
3-inch	13	15	38	.....	1	1	2	.....	.....	57
4-inch	6	9	24	.....	.....	1	2	.....	.....	36
6-inch	5	1	2	.....	.....	1	4	.....	.....	8
20-inch	1									
36-inch	2									
48-inch	2									
Total	44	298	89	1	17	3	13	2	6	429

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size								Total.	Cubic feet consumed.	Remarks.
						½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
25	Bill, J. R. & Co.	1824 E. Clearfield street	Hosiery Mfrs.	June 18	Crown		1							1	18,000	
25	Merchants' Ice Co.	3085 Helen street	Ice Mfrs	July 31	Crown					1				1	505,000	
25	Whittaker, Henry	Emerald, S. E. cor. Westmoreland street	Worsted Mill	Aug. 4	Trident						1			1	148,700	
25	Textile Chemical Co.	S. W. cor. Tioga and Belgrade streets	Chemicals	Oct. 3	Trident		1							1	68	
27	Gray, Wm. & Sons	N. E. cor. 30th and Locust streets	Marble Yard	May 15	Crown			1						1	2,000	
27	Psi-Upsilon Frater'ty	300 feet S. 36th, S. W. cor. Locust street	Club House	June 6	Crown				1					1	10,100	
27	Croft & Allen	3233-49 Woodland avenue	Candy Mfrs.	Oct. 1	Gem						1			1	20,600	
28	Phila. Traction Co.	Ridge av., E. s., N. E. cor. Susq. av.	Car Depot	March 7	Crown					1				1	1,362,100	
28	Phila. Traction Co.	Ridge av., E. s., N. E. cor. Susq. ave	Car Depot	March 7	Crown		1							1	9,300	
28	Liberty Chem. Co.	2555 Sydenham street	Chemicals	July 25	Crown			1						1	5,400	
29	N. United Pr. Church	S. s. Master, W. of Fifteenth street	Church and Organ	Feb. 2	Crown				1					1	8,100	
29	Van Lee, Alice A.	N. E. cor. 20th and Oxford streets	Ice and Cold Storage	March 5	Crown				1					1	24,600	
29	Froemner, Henry	1402 N. Twenty-second street	Scale Mfr.	March 21	Crown		1							1	269,800	
29	Filter Plant	Spring Garden Station		May 11	Crown			1						1	37,425	
29	Malloch, John	2222 Master street	Chemicals	June 20	Crown		1							1	2,800	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks
30	Merchant & Co	2019-27 Washington avenue	Tin Plate	March 31.	Gem						1			1	116,200	
31	Liggett, Alex.	2332 Letterly street	Laundry	Feb. 1.	Crown		1							1	37,800	
33	Fairhill M. E. Ch.	S. E. cor. 5th and Clearfield streets	Church and Organ.	March 22.	Crown				1					1	5,300	
33	Halton's, Thos., Sons	N. E. cor. Allegheny ave. and "C" street	Mill	March 26.	Crown						1			1	183,200	
33	Mathieu, J. P. & Co.	10th s. of Ontario street	Leather Mfrs.	April 17.	Crown				1					1	184,500	
33	Mathieu, J. P. & Co.	10th and Westmoreland streets	Leather Mfrs.	May 7.	Crown							1		1	1,247,900	
33	Mathieu, J. P. & Co.	Ontario, E. of 10th street	Leather Mfrs.	June 12.	Crown				1					1	454,800	
33	Mathieu, J. P. & Co.	10th, N. of Westmoreland street	Leather Mfrs.	June 14.	Crown				1					1	2,000	
33	American Mach. Co.	N. E. cor. Lehigh ave. and American st.	Machine Shop	July 17.	Stan'd						1			1	42,100	
33	Mathieu, J. P. & Co.	N. s. Westmoreland, W. of 9th street	Leather Mfrs.	Oct. 23.	Stan'd								1	1	1,797,000	
34	Hestonville Ice Mfg. Co.	5166-70 Jefferson street	Ice Mfrs.	June 20.	Gem							1		1	2,256,900	
34	Haverford Bldg. and Loan Assn.	E. s. 62d, N. of Girard avenue	Tapestry Mfr.	July 25.	Crown				1					1	4,500	
36	Richardson & Ross Asphalt Co.	W. s. 37th, S. of Wharton street		April 27.	Crown					1				1	145,300	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
36	Alcatraz Paving Co..	W. s. Schuylkill ave., 200 feet S. Whar'n	.....	May 21...	Crown	....	....	....	....	1	....	....	....	1	100,400	
36	Girard Estate.....	S. E. cor. 23d and Ritner streets.....	Furniture Mfr.....	June 5...	Crown	....	....	....	....	....	1	....	....	1	256,300	
36	Girard Estate.....	S. E. cor. 23d and Ritner streets.....	Furniture Mfr.....	June 14..	Gem	....	....	....	....	....	....	1	....	1	160	
36	Atlantic Ref. Co....	Old W. Passyunk ave., cor. River road..	Oil Works.....	Oct. 2....	Trident	....	1	....	....	....	....	....	....	1	1,600	
37	Crawford, Benj. T...	N. s. Glenwood, 56 feet E. of Park ave...	Biscuit Bakery.....	Feb. 7...	Gem	....	....	....	....	....	....	1	....	1	400,300	
38	Diamond Elec. Co...	S. W. cor. 17th and Clearfield streets.....	Electric Mfrs,.....	March 8..	Gem	....	....	....	....	....	....	1	....	1	1,315,500	
38	Amer. Card Clthg. Co.	S. E. cor. Bristol and Wayne streets.....	Mill Supplies.....	March 29.	Crown	....	1	....	....	....	....	....	....	1	400	Covers unused ferrule.
38	Ruffner, D. B.....	N. E. cor. Bowman and Cresson streets..	Machine Shop.....	June 19..	Crown	....	1	....	....	....	....	....	....	1	25,800	
38	Elec. Stor. Bat. Co..	S. W. cor. 19th and Allegheny avenue....	Electric Mfrs.....	Oct. 19..	Gem	....	....	....	....	....	1	....	....	1	.....	Supply not connected.
39	United Gas Imp. Co..	9th, from Mifflin to Dudley street.....	Office and Stable....	July 9...	Crown	....	....	....	....	1	....	....	....	1	103,900	
39	B. & O. R. R. Co.....	S. s. Snyder ave. and Ash street.....	Freight Office & Yard	Aug. 23..	Crown	....	....	....	....	....	....	1	....	1	33,300	
39	United Gas Imp. Co..	9th, S. E. cor. Mifflin to Dudley street....	Office and Stable....	Dec. 14..	Gem	....	....	....	....	1	....	....	....	1	7,700	
40	Callaghan, Albert....	S. W. cor. 60th st. and Baltimore ave.....	Cotton Mills.....	Feb. 7...	Crown	....	....	....	1	....	....	....	....	1	.....	Never used — no connection.
40	P. W. & B. R. R. Co..	W. s. Island rd., 100 feet S. of Elmwood..	Round House.....	Feb. 16..	Crown	....	....	....	1	....	....	....	....	1	36,600	
	Total.....					2	43	13	22	22	11	14	3	130	26,819,129	

	Total.	Meters Tested.								
		Crown.	Gem.	Nash.	Trident.	Torrent.	Standard.	Empire.	Pittsburg.	Total.
inch	.....	1	.....	1	.....	.....	.....	.....	.....	2
nch										
nch	6	105	.....	.....	8	.....	1	.....	4	118
ch	.....	65	.....	.....	.....	.....	.....	2	.....	67
inch	6	53	.....	.....	5	.....	3	.....	1	62
ch	3	49	25	.....	3	.....	1	.....	1	79
ch	13	15	38	.....	1	1	2	.....	.....	57
ch	6	9	24	.....	.....	1	2	.....	.....	36
ch	5	1	2	.....	.....	1	4	.....	.....	8
ch	1									
ch	2									
ch	2									
Total	44	298	89	1	17	3	13	2	6	429

DISTRIBUTION EXPENSES DURING THE YEAR 1900,

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.	Distribution.	Meter Shops.	Main Office.	Totals.
Lead	$2,230 08	$19,752 18	$25,022 40	$5,813 28	$967 90	$1,943 55	$2,499 94			$58,229 33
Gasket		184 13	107 94		20 68					312 75
Coke	38 00	125 55	414 18	274 20	47 70	137 80				1,037 43
Wood						72 00				72 00
Pipes							284,110 25			284,110 85
Small specials							16,010 97			16,010 97
Large specials							15,839 32			15,839 32
Frames and covers	487 17	482 28	1,141 39	395 76	76 47	79 80				2,662 87
Hauling, transportation, hotel	120 00	160 00	95 94	25 00	196 95	120 00		$110 00	$20 00	10,142 22
Supples, tools, small stores, etc.	747 69	5,286 59	3,012 69	3,880 76	2,584 36	1,121 81	3,351 68	2,412 05	176 82	22,574 45
Plumbing and plumbing supplies					137 77	10 76	4,504 60			4,653 13
Meters, etc								13,035 74		13,035 74
Repairs to buildings, etc					16 80					16 80
Brick, stone, lime and cement	209 00	557 58	1,092 74	614 26	1,062 50	177 45	210 00	26 00		3,949 53
Lumber	5,807 45	808 09	4,118 06	488 78	1,410 91	366 27				12,999 56
Hay, feed, etc	665 85	768 50	731 71	779 49	157 57	128 95				3,232 07
Stable supplies	460 05	101 88	208 88	190 88	71 10	298 04				1,330 33

Distribution Expenses—Continued.

Material and Labor.	First District.	Second District.	Third District.	Fourth District.	Fifth District.	Sixth District.	Distribution.	Meter Shops.	Main Office.	Total.
Stable repairs	$213 15	$205 65	$233 12	$81 85	$19 40	$28 60	.....	.....	.....	$781 77
Stable medicines	39 00	37 80	11 75	20 00	5 00	.....	.....	.....	.....	113 55
Stable shoeing	170 75	164 30	188 25	170 00	22 00	27 00	.....	.....	.....	742 30
Supplies, stationery	108 31	203 43	72 07	29 32	37 20	55 55	$759 99	$6 83	$325 80	1,598 50
Excavating for 36 and 48 inch pipe trench	.....	.....	.....	.....	1,583 40	569 07	.....	.....	.....	2,152 47
Cast iron stop boxes	353 14	2,324 47	386 86	1,758 53	.....	428 20	.....	.....	.....	5,251 20
Wages ..... Per diem	23,752 04	69,494 49	153,905 64	43,169 83	31,329 25	38,752 60	5,254 99	11,748 78	4,460 75	381,868 37
Wages ..... Salary	4,280 30	5,999 00	7,350 88	7,238 06	2,032 88	3,543 62	.....	.....	.....	30,444 74
Total cost of labor and material on account of distribution	39,681 98	106,655 42	198,094 50	64,930 00	41,779 84	47,861 07	341,836 07	27,339 40	4,983 37	873,161 65
Buildings, grounds and reservoirs	.....	2,539 13	3,313 77	3,853 61	12,710 45	12 50	.....	835 19	.....	23,264 65
Bureau of Surveys, labor	.....	.....	.....	14,349 15	.....	.....	.....	.....	.....	14,349 15
Service main on Moreland and Cherokee avenues	.....	.....	.....	.....	.....	*18 38	.....	.....	.....	18 38
Total labor and material	$39,681 98	$109,194 55	$201,408 27	$83,132 76	$54,490 29	$47,891 95	$341,836 07	$28,174 59	$4,983 37	$910,793 83

* Paid by private contract.

Schedule of Pipe and Special Castings Rejected and Accepted During 1900.

	Manufacturer.	Size in Inches. Pipe.	Special Castings.	Ordered.	Inspected.	Rejected.	Cancelled.	Accepted. Quantity.	Cost.
Bureau of Water.	Donaldson Iron Co., Emaus, Pa.	6		12,000	14,075	2,075		12,000	$56,897 62
		8		500	605	105		500	3,193 62
		20		762	948	186		762	16,336 11
	U. S. C. I. Pipe and Fdy. Co., Burlington, N. J. and Scottdale, Pa.	10		500	537	37		500	4,187 20
		12		1,000	1,080	80		1,000	11,409 78
		16		600	616	16		600	9,959 28
		30		702	751	49		702	30,779 64
		36		560	567	7		560	36,716 04
		48		1,100	1,232	132		1,100	114,630 96
			30	5	5			5	314 81
	Donaldson Iron Co.		3 to 20	4,403	4,747	344		4,403	16,010 97
	Reading Fdy. Co.		30 to 48	200	220	20	27	173	13,730 39
	J. Howard Bing, Phila.		stop boxes	465	473	8		465	5,251 20
			covers.	465	472	7		465	
			frames.	752	760	8		752	2,662 87
			covers.	827	847	20		827	
	Reading Fdy. Co., Reading, Pa		mch. work						1,794 12
	Total			24,841	27,935	3,094	27	80,814	$323,874 61

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

	Manufacturer.	Size in Inches.		Ordered.	Inspected.	Rejected.	Cancelled.	Accepted.	
		Pipe.	Special Castings.					Quantity.	Cost.
Bureau of Correction.	R. D. Wood & Co., Florence and Camden, N.J.	3	.....	250	1,200	950	.....	250	$495 00
		6	.....	100	150	50	.....	100	438 00
	Totals	.....	.....	350	1,350	1,000	.....	350	933 00
B. & O. R. R. Co. (Private).	Donaldson Iron Co., Emaus, Pa.	4	.....	150	150	.....	.....	150	448 63
		.....	4	11	11	.....	.....	11	17 78
	Totals	.....	.....	161	161	.....	.....	161	466 41
Bureau of Surveys.	Reading Fdy. Co., Ltd., Reading, Pa.	24	.....	23	23	.....	.....	23	1,200 00
	Grand totals	.....	.....	25,375	29,409	4,004	27	81,548	$326,474 02

FOR THE YEAR

ISCONTINUED.

TAKEN OUT.

Gem.	Nash.	Trident.	Total.	Crown.	Gem.
....	....	....	1	22	.....
....	....	1	1	.....	.....
....	2	5	79	165	.....
....	.....	1	39	186	.....
....	1	....	24	129	.....
7	....	....	23	164	85
6	....	....	10	70	85
13	....	....	16	45	174
....	....	....	.....	6	20
....	....	....	....	.....	.....
....	....	....	.....	.....	.....
....	....	....	.....	.....	.....
....	....	....	.....	.....	.....
....	....	....	.....	.....	.....
26	3	7	193	787	370

ters dismantled and do not sh

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet consumed.	Remarks.
36	Alcatraz Paving Co..	W. s. Schuylkill ave., 200 feet S. Whar'n	.....	May 21...	Crown..	....	....	....	....	1	....	....	....	1	100,400	
36	Girard Estate.....	S. E. cor. 23d and Ritner streets.....	Furniture Mfr.....	June 5...	Crown..	....	....	....	....	....	1	....	....	1	256,300	
36	Girard Estate.....	S. E. cor. 23d and Ritner streets.....	Furniture Mfr.....	June 14..	Gem....	....	....	....	....	....	....	1	....	1	160	
36	Atlantic Ref. Co....	Old W. Passyunk ave., cor. River road..	Oil Works.....	Oct. 2....	Trident.	....	1	....	....	....	....	....	....	1	1,600	
37	Crawford, Benj. T...	N. s. Glenwood, 56 feet E. of Park ave...	Biscuit Bakery.....	Feb. 7...	Gem ...	....	....	....	....	....	....	1	....	1	400,300	
38	Diamond Elec. Co...	S. W. cor. 17th and Clearfield streets.....	Electric Mfrs,.....	March 8..	Gem....	....	....	....	....	....	....	1	....	1	1,315,500	
38	Amer. Card Clthg. Co.	S. E. cor. Bristol and Wayne streets.....	Mill Supplies.....	March 29.	Crown..	....	1	....	....	....	....	....	....	1	400	Covers unused ferrule.
38	Ruffner, D. B.....	N. E. cor. Bowman and Cresson streets..	Machine Shop.....	June 19..	Crown..	....	1	....	....	....	....	....	....	1	25,800	
38	Elec. Stor. Bat. Co..	S. W. cor. 19th and Allegheny avenue....	Electric Mfrs.....	Oct. 19..	Gem ...	....	....	....	....	....	1	....	....	1	.....	Supply not connected.
39	United Gas Imp. Co..	9th, from Mifflin to Dudley street.....	Office and Stable....	July 9...	Crown..	....	....	....	....	1	....	....	....	1	103,900	
39	B. & O. R. R. Co.....	S. s. Snyder ave. and Ash street.....	Freight Office & Yard	Aug. 23..	Crown..	....	....	....	....	....	....	1	....	1	33,300	
39	United Gas Imp. Co..	9th, S. E. cor. Mifflin to Dudley street....	Office and Stable....	Dec. 14..	Gem ...	....	....	....	....	1	....	....	....	1	7,700	
40	Callaghan, Albert....	S. W. cor. 60th st. and Baltimore ave.....	Cotton Mills.....	Feb. 7...	Crown..	....	....	....	1	....	....	....	....	1	.....	Never used — no connection.
40	P. W. & B. R. R. Co..	W. s. Island rd., 100 feet S. of Elmwood..	Round House.....	Feb. 16..	Crown..	....	....	....	1	....	....	....	....	1	36,600	
	Total.....					2	43	13	22	22	11	14	3	130	26,819,129	

	Meters Tested.									
	Total.	Crown.	Gem.	Nash.	Trident.	Torrent.	Standard.	Empire.	Pittsburg.	Total.
½-inch	.....	1	.....	1	.....	.....	.....	.....	.....	2
⅝-inch										
¾-inch	6	105	.....	.....	8	.....	1	.....	4	118
1-inch	.....	65	.....	.....	.....	.....	.....	2	.....	67
1½-inch	6	53	.....	.....	5	.....	3	.....	1	62
2-inch	3	49	25	.....	3	.....	1	.....	1	79
3-inch	13	15	38	.....	1	1	2	.....	.....	57
4-inch	6	9	24	.....	.....	1	2	.....	.....	36
6-inch	5	1	2	.....	.....	1	4	.....	.....	8
20-inch	1									
36-inch	2									
48-inch	2									
Total	44	298	89	1	17	3	13	2	6	429

DISTRIBUTION EXPENSES DURING THE YEAR 1900,

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.	Distribution.	Meter Shops.	Main Office.	Totals.
Lead	$2,230 08	$19,752 18	$25,022 40	$5,813 28	$967 90	$1,943 55	$2,499 94	.....	.....	$58,229 33
Gasket	.....	184 13	107 94	.....	20 68	.....	.....	.....	.....	312 75
Coke	38 00	125 55	414 18	274 20	47 70	137 80	.....	.....	.....	1,037 43
Wood	.....	.....	.....	.....	.....	72 00	.....	.....	.....	72 00
Pipes	.....	.....	.....	.....	.....	.....	284,110 25	.....	.....	284,110 85
Small specials	.....	.....	.....	.....	.....	.....	16,010 97	.....	.....	16,010 97
Large specials	.....	.....	.....	.....	.....	.....	15,839 32	.....	.....	15,839 32
Frames and covers	487 17	482 28	1,141 39	395 76	76 47	79 80	.....	.....	.....	2,662 87
Hauling, transportation, hotel	120 00	160 00	95 94	25 00	196 95	120 00	.....	$110 00	$20 00	10,142 22
Supples, tools, small stores, etc.	747 69	5,286 59	3,012 69	3,880 76	2,584 36	1,121 81	3,351 68	2,412 05	176 82	22,574 45
Plumbing and plumbing supplies	.....	.....	.....	.....	137 77	10 76	4,504 60	.....	.....	4,653 13
Meters, etc.	.....	.....	.....	.....	.....	.....	.....	13,035 74	.....	13,035 74
Repairs to buildings, etc.	.....	.....	.....	.....	16 80	.....	.....	.....	.....	16 80
Brick, stone, lime and cement	209 00	557 58	1,092 74	614 26	1,062 50	177 45	210 00	26 00	.....	3,949 53
Lumber	5,807 45	808 09	4,118 06	488 78	1,410 91	366 27	.....	.....	.....	12,999 56
Hay, feed, etc.	665 85	768 50	731 71	779 49	157 57	128 95	.....	.....	.....	3,232 07
Stable supplies	460 05	101 38	208 88	190 88	71 10	298 04	.....	.....	.....	1,330 33

Distribution Expenses—Continued.

Material and Labor.	First District.	Second District.	Third District.	Fourth District.	Fifth District.	Sixth District.	Distribution.	Meter Shops.	Main Office.	Total.
Stable repairs	$213 15	$205 65	$233 12	$81 85	$19 40	$28 60	.....	.....	.....	$781 77
Stable medicines	39 00	37 80	11 75	20 00	5 00	.....	.....	.....	.....	113 55
Stable shoeing	170 75	164 30	188 25	170 00	22 00	27 00	.....	.....	.....	742 30
Supplies, stationery	108 31	203 43	72 07	29 32	37 20	55 55	$759 99	$6 83	$325 80	1,598 50
Excavating for 36 and 48 inch pipe trench	.....	.....	.....	.....	1,583 40	569 07	.....	.....	.....	2,152 47
Cast iron stop boxes	353 14	2,324 47	386 86	1,758 53	.....	428 20	.....	.....	.....	5,251 20
Wages ..... Per diem	23,752 04	69,494 49	153,905 64	43,169 83	31,329 25	38,752 60	5,254 99	11,748 78	4,460 75	381,868 37
Wages ..... Salary	4,280 30	5,999 00	7,350 88	7,238 06	2,032 88	3,543 62	.....	.....	.....	30,444 74
Total cost of labor and material on account of distribution	39,681 98	106,655 42	198,094 50	64,930 00	41,779 84	47,861 07	341,836 07	27,339 40	4,983 37	873,161 65
Buildings, grounds and reservoirs	.....	2,539 13	3,313 77	3,853 61	12,710 45	12 50	.....	835 19	.....	23,264 65
Bureau of Surveys, labor	.....	.....	.....	14,349 15	.....	.....	.....	.....	.....	14,349 15
Service main on Moreland and Cherokee avenues	.....	.....	.....	.....	.....	*18 38	.....	.....	.....	18 38
Total labor and material	$39,681 98	$109,194 55	$201,408 27	$83,132 76	$54,490 29	$47,891 95	$341,836 07	$28,174 59	$4,983 37	$910,793 83

* Paid by private contract.

	Manufacturer.	Size in Inches.		Ordered.	Inspected.	Rejected.	Cancelled.	Accepted.	
		Pipe.	Special Castings.					Quantity.	Cost.
Bureau of Water.	Donaldson Iron Co., Emaus, Pa.	6		12,000	14,075	2,075		12,000	$56,897 62
		8		500	605	105		500	3,193 62
		20		762	948	186		762	16,336 11
	U. S. C. I. Pipe and Fdy. Co., Burlington, N. J. and Scottdale, Pa.	10		500	537	37		500	4,187 20
		12		1,000	1,080	80		1,000	11,409 78
		16		600	616	16		600	9,959 28
		30		702	751	49		702	30,779 64
		36		560	567	7		560	36,716 04
		48		1,100	1,232	132		1,100	114,630 96
			30	5	5			5	314 81
	Donaldson Iron Co.		3 to 20	4,403	4,747	344		4,403	16,010 97
	Reading Fdy. Co.		30 to 48	200	220	20	27	173	13,730 39
	J. Howard Bing, Phila.		stop boxes	465	473	8		465	5,251 20
			covers.	465	472	7		465	
			frames.	752	760	8		752	2,662 87
			covers.	827	847	20		827	
	Reading Fdy. Co., Reading, Pa		mch. work						1,794 12
	Total			24,841	27,935	3,094	27	80,814	$323,874 61

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

	Manufacturer.	Size in Inches.		Ordered.	Inspected.	Rejected.	Cancelled.	Accepted.	
		Pipe.	Special Castings.					Quantity.	Cost.
Bureau of Correction.	R. D. Wood & Co., Florence and Camden, N.J.	3	.....	250	1,200	950	.....	250	$495 00
		6	.....	100	150	50	.....	100	438 00
	Totals	.....	.....	350	1,350	1,000	.....	350	933 00
B. & O. R. R. Co. (Private).	Donaldson Iron Co., Emaus, Pa.	4	.....	150	150	.....	.....	150	448 63
		.....	4	11	11	.....	.....	11	17 78
	Totals	.....	.....	161	161	.....	.....	161	466 41
Bureau of Surveys.	Reading Fdy. Co., Ltd., Reading, Pa.	24	.....	23	23	.....	.....	23	1,200 00
	Grand totals	.....	.....	25,375	29,469	4,094	27	81,548	$326,474 02

FOR THE YEAR

ISCONTINUED.

TAKEN OUT.

Gem.	Nash.	Trident.	Total.	Crown.	Gem.
.....	.....	.....	1	22	.....
.....	.....	1	1	.....	.....
.....	2	5	79	165	.....
.....	.....	1	39	186	.....
.....	1	.....	24	129	.....
7	.....	.....	23	164	85
6	.....	.....	10	70	85
13	.....	.....	16	45	174
.....	.....	.....	.....	6	20
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
26	3	7	193	787	370

ers dismantled and do not sh

Attachments Made and Delivered to Districts during the year 1900.

Districts.	Attachments Made and Delivered.	Lead Pipe. Feet.				Total.
		⅝-inch.	¾-inch.	1-inch.	2-inch.	
First	879	9,299				9,299
Second	672	13,039				13,039
Third	2,051	29,873		32	17	29,922
Fourth	435	5,746				5,746
Fifth	295	4,465				4,465
Sixth	542	7,854	430			8,284
Total	4,874	70,276	430	32	17	70,755

APPENDIX D.

REPORT

OF

Operations at the Construction and Repair Shop, Bureau of Water, during 1900.

Philadelphia, January 12, 1901.

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

SIR:—I herewith submit the annual report of operations at the Construction and Repair Shop, Twelfth and Reed steets, for the year ending December 31, 1900.

Respectfully,

JAMES H. DEAN,
Superintendent of Shop.

MERCHANDISE.		Dr.
To stock, as per inventory, Jan. 1, 1900		$36,064 45
Bolts and nuts	$1,020 60	
Hardware	316 89	
Steel	971 80	
Wrought iron	2,015 19	
Iron castings	26,078 44	
Brass castings	7,975 63	
Lead coating	277 95	
Expansion metal	134 75	
Lumber	700 02	
Paints, oils, brushes, etc.	114 58	
Oils and tallow	123 50	
Chandlery	194 70	
Coal	1,300 88	
Coke	7 60	
Gum goods	417 59	
Plug valves	1,647 00	
Brass fittings	47 08	
Wrought iron pipe and fittings	12 21	
Forage, stable supplies, etc.	172 16	
Packing	1 50	
Miscellaneous	728 41	
Wages	31,957 01	
		76,215 95
		$112,280 40
First District	$4,566 02	
Second District	11,842 11	
Third District	19,154 21	
Fourth District	9,419 15	
Fifth District	4,120 04	
Sixth District	5,805 94	
		54,907 47
Fairmount machinery	$269 50	
Spring Garden machinery	2,743 37	
Spring Garden Boilers	3,296 14	
Belmont machinery	976 26	
Belmont boilers	952 84	
Queen Lane machinery	2 033 10	
Queen Lane boilers	323 13	
Roxborough machinery	2,394 12	
Roxborough boilers	451 74	
Frankford machinery	2,470 70	
Frankford boilers	645 67	
Mt. Airy machinery	116 81	
		16,673 38

Buildings, grounds and reservoirs	$4,041 70	
Meter department	649 47	
Main office	58 81	
Hydrographic work	11 35	
Experimental filter	736 90	
Distribution	1,824 67	
Fixed patterns	767 31	
Shop machinery	207 90	
Construction and repair shop	1,085 45	
Old metals	1,342 45	
		$10,726 01
Total		$82,306 86
Total Cr.	$82,306 86	
Inventory, January 1, 1901	34,909 05	
	$117,215 91	
Total Dr.	112,280 40	
Balance		$4 935 51

INVENTORY, JANUARY 1, 1901.

43 No. 1 fire hydrants, at $28.00	$1,204 00	
33 No. 2 fire hydrants, at $35.00	1,155 00	
1 4-inch stop valve, at $13.00	13 00	
2 6-inch stop valves, at $14.50	29 00	
1 8-inch stop valve, at $22.00	22 00	
5 10-inch stop valves, at $30.00	150 00	
9 12-inch stop valves, at $37.00	333 00	
2 16-inch stop valves, at $65.00	130 00	
2 20-inch stop valves, at $100.00	200 00	
2 36-inch stop valves, flanged, at $300	600 00	
2 6-inch globe valves, at $30.00	60 00	
8 8-inch globe valves at $40.00	320 00	
4 10-inch globe valves, at $55.00	220 00	
		$4,436 00
3 20-inch check valves, bell end, at $170.	$510 00	
2 20-inch check valves, flanged, at $200	400 00	
1 30-inch rotary valve	455 00	
6 48-inch rotary valves, unfinished	3,205 16	
3 30-inch rotary valves, unfinished	1,275 00	
15 30-inch quadrants, at $7.00	105 00	
4 48-inch quadrants, at $10.75	43 00	
4 bell cranks, at $15.00	60 00	
1 air pump barrel, at $15.00	15 00	
12 2-inch fish traps, at $3.25	39 00	
		$6 107 16

Finished parts of fire hydrants	$1,657 32	
Finished parts of stop valves	1,817 95	
		$3,475 27
80 old style stop screws	$579 75	
51 Viney stop screws, at $1.75	89 25	
29 Viney stop screws, at $4.50	130 50	
59 Barton stop screws, at $4.00	236 00	
12 Barton stop screws and bonnet, at $8.00	96 00	
4 drilling machines, small, at $45.00	180 00	
2 drilling machines, large, at $65.00	130 00	
		1,441 50
394 new style stop screws 4 in. to 48 in.	$1,229 75	
132 socket screws, at $2 00	264 00	
69 spindles, at $2.25	154 75	
		1,648 50
433 4-inch fire hydrant valves, at 74c.	$320 42	
347 6-inch fire hydrant valves, at $1.74	603 78	
		924 20
540 iron bands, 4-inch to 48-inch	$1,349 00	
		1,349 00
22 air pump straps, at $9.50	$209 00	
78 air pump brasses, at $2.50	195 00	
51 sets gibs and keys, at $4.50	229 50	
16 pump rods, unfinished	304 90	
2 pump rods, finished	39 50	
		977 90
Articles and tools carried in stock, issued to districts	$2,001 09	
		2,001 09
56,565 pounds wrought iron, at 3 cents	$1,696 95	
1,464 pounds iron forgings, at 9 cents	131 76	
18 390 pounds steel	1,263 07	
1,470 pounds expansion metal, at 24½ cts.	360 15	
22,010 pounds lead at 4.97½ c.	1,095 00	
345 pounds Babbit metal, at 14 cents	48 30	
46 pounds bismuth, at $1.95	89 70	
		4,684 93
83,362 pounds stop valve castings, at 2.74c.	$2,284 12	
39,727 pounds fire hydrant castings, at 2½c.	993 18	
10,580 pounds loam castings, at 4¾ cents	502 55	
9,106 pounds brass castings	1,506 89	
2,872 pounds Ajax metal castings, at 23⅝c.	678 51	
442 pounds rolled brass, at 22 cents	97 24	
		6,062 49

Hardware	$263 71	
Bolts and nuts	773 21	
Oils and tallows	22 90	
Paints brushes, etc	28 16	
Gum goods	124 27	
Lumber	588 76	
		$1,801 01
		$34,909 05

Principal Articles delivered to Purveyors' Districts and Works.

Districts.	No. 1 Fire Hydrants.	No. 2 Fire Hydrants.	Wedge Stop Valves.									Check Valves.			Rotary Valves.			Plugs.		Stop Box Risers.	Fish Traps.					Iron Bands.
			4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	36-inch.	20-inch.	30-inch.	36-inch.	20-inch.	30-inch.	48-inch.	Wood.	Brass.		1¼-inch.	2-inch.	3-inch.	4-inch.	6-inch.	
First	59	....	....	80	2	15	2	....	....	....	....	....	....	....	....	....	....	108	433	....	....	....	....	....	....	6
Second	146	30	....	202	28	25	9	9	4	....	....	....	....	....	....	....	....	106	396	217						
Third	210	2	2	294	15	50	21	5	5	1	....	....	....	....	3	2	1	160	606	564	....	....	....	....	....	97
Fourth	65	15	20	133	....	10	24	2	....	....	....	....	1	3	....	....	....	....	186	181	....	....	....	....	....	19
Fifth	61	....	....	42	....	....	1	....	....	3	....	....	....	....	....	....	....	....	110	....	....	....	....	....	....	9
Sixth	123	....	4	70	....	3	14	....	....	....	....	....	....	....	....	....	....	87	90	145	....	....	....	....	....	12
Distribution	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Meter Department	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	24	24	12	12	12	....
Works	....	....	....	....	....	....	....	....	....	2	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total	664	47	26	816	45	103	71	16	9	6	1	4	2	3	3	2	1	461	1821	1107	24	24	12	12	12	143

PRINCIPAL ARTICLES MANUFACTURED DURING 1900.

560	No. 1 fire hydrants, at $28.00.....	$15,680 00	
81	No. 2 fire hydrants, at $35.00.....	2,835 00	
18	4-inch stop valves, at $13.00.....	234 00	
632	6-inch stop valves, at $14.50	9,164 00	
29	8-inch stop valves, at $22.000.....	638 00	
92	10-inch stop valves, at $30.00	2,760 00	
70	12-inch stop valves, at $37.00.....	2,590 00	
15	16-inch stop valves, at $65.00.....	975 00	
6	20-inch stop valves, at $100	600 00	
1	36-inch stop valve, heavy, flanged...	400 00	
3	30-inch rotary stop valves, at $455.00	1,365 00	
4	20-inch check valves, flanged, extra heavy, at $200.00.....	800 00	
1	36-inch check valve.....	375 00	
4	48-inch foot valves (Q. L. Intake), at $336.00.....	1,344 00	
1	electric motor truck.....	885 00	
96	fish traps	555 00	
318	wooden plugs, at 50 cents.....	159 00	
1,044	brass plugs.....	365 40	
1,056	stop box risers, at 35 cents.....	369 60	
663	stop screws, 4-inch to 48-inch.....	1,653 80	
			$43,747 80

APPENDIX E.

REPORT

OF THE

Chief Draughtsman for the Year 1900

Philadelphia, January 9, 1901.

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

DEAR SIR:—The following report of work under my charge for the year 1900 is respectfully submitted:

Besides many statistical diagrams, which were made but were not recorded, there have been made and recorded one hundred and forty-three (143) drawings, as follows:

Plans and details of buildings	41
Plan of reservoir	1
Details of intakes and conduits	6
Details of stand pipes	2
Special machinery	30
Special castings	9
Surveys, profiles, etc	6
Details of engines	35
High Pressure Fire Service	12
Pumpage diagram	1
Total	143

Most of these drawings required much time and labor for perfecting them.

Specifications for work which required to be advertised were prepared as follows: Four (4) new steel plate boilers, 160 pounds steam pressure, for Belmont Pumping Station, Robert Wetherill & Co., contractors; three (3) new 10,000,000 gallon daily capacity pumping engines, for Belmont Pumping Station, Holly Manufacturing Co., contractors; new engine and boiler house, new intake and steel pipe conduit for Belmont Pumping Station, George C. Dietrich, contractor; electrical engines and generators for Belmont, Queen Lane and Roxborough Pumping Stations; removal of pumping engine from Roxborough Station and re-erection of same at Frankford Pumping Station.

The steel plate for the four (4) boilers built by Robert Wetherill & Co. was rolled by the Central Steel Company, of Harrisburg, Pa.

I made the inspection and test of the material at Harrisburg on July 11th, 12th and 13th, and attach a copy of result of same to this report.

Specification and plans for new High Pressure Fire Service have been printed.

During the year about 2,500 blue prints were made of various parts of machinery, for the use of the machine shop and of contractors.

The labor of making blue prints has been very much reduced and a great deal of time saved by the introduction of a photo-engraving lamp, purchased from the Helios Electric Co. By the use of this lamp blue prints can be made in from 15 to 20 minutes, and the work is no longer dependent upon the state of the weather or the time of day.

Previous to the purchase of this lamp all prints were made at the machine shop at Twelfth and Wharton streets,

and even though a print was needed for immediate use it could not be obtained in less than two or three hours.

Photographic prints of work under contracts, showing the progress made during each month, were made by either the photographer or the draughtsmen.

Two draughtsmen were, during the year, transferred from this Bureau to the Engineer Corps for the Improvement, Extension and Filtration of the Water Supply.

From data prepared by inspectors of the Bureau 680 calculations for boiler horse power were made. From these calculations are determined the water rents to be paid by owners of steam boilers using City water.

The daily pumpage chart for the year 1900 has been prepared, but the stream flow charts cannot be made until next year.

The following partial report on hydrographic work and data collected during the year is respectfully submitted:

Rainfall observations at sixteen stations, three of which are provided with automatic gauges, have been continued, completing eighteen years of continuous records of data relating to precipitation.

No appropriation was made for this work for the year 1900, but nearly all of the observers volunteered to keep the records during the year, upon being informed that Councils would, in view of the importance of the work, make the necessary appropriation for the year 1901.

Such appropriation having been made, all the observers are again at work as formerly. Data has been received, but too late for its incorporation in this report. It will be worked up and will appear in the Annual Report for the year 1901.

Stream flow observations by automatic gauges on the Perkiomen, Neshaminy and partially on the Tohickon streams, have been continued, completing seventeen years of continuous records for the Perkiomen and Neshaminy.

The record for the Tohickon will be computed for the missing portion, sufficient data being on hand to complete the records.

Observations on the Wissahickon, begun in 1897, were discontinued in June, 1899, but were resumed in July, 1900.

Observations on the Schuylkill, with the automatic gauge, put in operation in 1897, have been continued at Fairmount, and the computed flow of the stream is given in table—

These computations, although rather crude, seem nevertheless, to compare favorable with results obtained in a more accurate manner.

The automatic rain gauge in Philadelphia recorded 12 storms in which the rate exceeded more than .25 of an inch per hour.

The following named persons have been engaged as volunteer observers and rodmen during the year:

John G. Hilsman, rodman and gauge observer, Rush Valley P. O.

George W. Wood, rodman and gauge observer, Spring Mount, Pa.

Dr. George M. Grim, gauge observer, Ottsville.

George Louder, gauge observer, Smith's Corner, P. O. Point Pleasant.

Dr. J. A. Roth, gauge observer, Seisholtzville.

A. W. Walton, gauge observer, Doylestown.

H. L. Schull, gauge observer, Lansdale.

Yours respectfully,

JOHN E. CODMAN,
Chief Draughtsman.

TEST OF STEEL BOILER PLATES

Made by John E. Codman, Chief Draughtsman, Bureau of Water, Department of Public Works, at Central Iron and Steel Co., Harrisburg, Penna., July, 1900.

Marks.	Measurements.			Applied load.	Strain in pounds per sq. inch.	Elongation in Eight Inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Per-centage		
A 1	1.235	.894	1.104	40,200	36,410	Elastic limit.						C .15	Shell—Bent.
				59,000	36,410	.50						P .007	
12793				63,700	57,770	1.00						Mn .22	
				63,700	57,770	1.50						S .023	
				63,700	57,770	2.14	26.7	.885	.575	.509	53.9		
A 2	1.235	.876	1.082	36,900	34,100	Elastic limit.							Shell—Bent.
				54,100	50,000	.50							
12793				59,400	54,900	1.00							
				59,400	54,900	1.50							
				59,400	54,900	2.36	29.5	.825	.525	.433	60.0		
A 3	1.215	.875	1.063	34,000	31,980	Elastic limit.							Shell—Bent.
				53,600	50,420	.50							
12793				57,900	54,470	1.00							
				58,800	55,300	1.50							
				58,800	55,300	2.20	27.5	.870	.530	.461	56.6		
A 4	1.225	.880	1.078	34,400	31,910	Elastic limit.							Shell—Bent.
				49,200	45,640	.50							
12793				56,000	51,950	1.00							
				59,900	55,570	1.50							
				59,900	55,570	2.04	25.5	.870	.570	.496	54.0		

NOTE.—Boilers 20 feet long, ⅞-inch shell. Built by Robert Wetherill & Co., Chester, Pa., for Belmont Pumping Station, 1900.

Test of Steel Plate— Continued.

Marks.	Measurements.			Applied load.	Strain in pounds per sq. inch.	Elongation in Eight Inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Per-centage		
A 5	1.110	.876	.972	33,200	34,160	Elastic limit.							Shell—Bent.
				49,000	50,410	.50							
12793				53,400	54,940	1.00							
				53,400	54,940	1.50							
				53,400	54,940	2.08	26.0	.790	.510	.403	58.5		
A 6	1.215	.888	1.079	42,100	39,020	Elastic limit.							Shell—Bent.
				58,000	53,750	.50							
12793				60,600	56,160	1.00							
				60,600	56,160	1.50							
				60,600	56,160	2.22	27.7	.840	.560	.470	56.4		
A 7	1.150	.894	1.028	36,000	35,020	Elastic limit.						C. .19	Shell—Bent.
				53,900	52,430	.50						P. .021	
8578				57,300	55,730	1.00						Mn. .37	
				58,100	56,510	1.50						S. .032	
				58,100	56,510	2.40	30.0	.780	.560	.437	57.5		
A 8	1.170	.888	1.039	35,000	33,680	Elastic limit.							Shell—Bent.
				56,300	54,180	.50							
8578				61,250	58,940	1.00							
				61,250	58,940	1.50							
				61,250	58,940	2.18	27.2	.830	.610	.506	51.3		

Test of Steel Plate—Continued.

Marks.	Measurements.			Applied load.	Strain in pounds per sq. inch.	Elongation In Eight Inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Percentage		
B 1	1.165	.905	1.054	34,400	32,630	Elastic limit.							Shell—Bent.
				54,200	51,420	.50							
8578				58,900	55,880	1.00							
				58,900	55,880	1.50							
				58,900	55,880	2.20	27.5	.815	.600	.489	53.6		
B 2	1.165	.889	1.036	37,200	35,900	Elastic limit.							Shell—Bent.
				54,100	52,210	.50							
8578				57,800	55,780	1.00							
				57,800	55,780	1.50							
				57,800	55,780	2.20	27.5	.850	.600	.510	50.8		
B 3	1.160	.877	1.017	36,100	35,490	Elastic limit.							Shell—Bent.
				53,400	52,500	.50							
8578				56,800	55,850	1.00							
				56,800	55,850	1.50							
				56,800	55,850	2.20	27.5	.810	.565	.458	55.0		
B 4	1.120	.895	1.002	32,700	32,630	Elastic limit.							Shell—Bent.
				54,600	54,490	.50							
8578				58,300	58,230	1.00							
				59,060	58,940	1.50							
				59,060	58,940	2.36	27.5	.795	.580	.461	54.0		

Test of Steel Plate—Continued.

Marks.	Measurements.			Applied Load.	Strain in pounds per sq. inch.	Elongation in Eight Inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Per-centage		
B 5	1.120	.875	.980	37,300	38,060	Elastic limit.							Shell—Bent.
8578				53,300	54,380	.50							
				56,750	57,910	1.00							
				56,750	57,910	1.50							
				56,750	57,910	2.24	28.0	.860	.575	.495	49.5		
B 6	1.125	.876	.986	35,100	35,590	Elastic limit.							Shell—Bent.
8578				55,600	56,390	.50							
				59,050	59,880	1.00							
				59,400	60,240	1.50							
				59,400	60,240	2.06	25.7	.850	.600	.510	48.3		
B 7	1.125	.876	.986	35,600	36,100	Elastic limit.							Shell—Bent.
8578				53,100	53,850	.50							
				56,300	57,100	1.00							
				56,600	57,400	1.50							
				56,600	57,400	2.22	27.7	.830	.560	.465	52.8		
B 8	1.125	.877	.987	34,000	34,440	Elastic limit.							Shell—Bent.
8578				51,100	51,770	.50							
				55,500	56,220	1.00							
				55,500	56,220	1.50							
				55,500	56,220	2.20	27.5	.810	.560	.454	54.0		

Test of Steel Plate—Continued.

Marks.	Measurements. Breadth.	Width.	Area.	Applied Load.	Strain in pounds per sq. inch	Elongation In Eight Inches. Elongation in Inches.	Elongation in percentage.	Reduction of Area. Breadth.	Width.	Area.	Percentage	Chemical analysis.	Remarks.
D 1 to 6	1.130	.563	.636	19,700	30,970	Elastic limit.						C .16	Butt strap.
				31,100	48,900	.50						P .010	
8403				34,400	54,080	1.00						Mn .25	
				34,400	54,080	1.50						S .035	
				34,400	54,080	2.60	32.5	.750	.285	.214	66.3		
D 7 to 12	1.150	.585	.673	21,900	32,540	Elastic limit.							Butt strap.
				34,500	51,260	.50							
8403				37,400	55,570	1.00							
				38,200	56,760	1.50							
				38,200	56,760	2.08	26.0	.825	.380	.314	53.3		
D	1.130	.564	.637	20,600	32,340	Elastic limit.						C .13	Butt Strap.
13 & 14				30,000	47,090	.50						P .011	
C 1 to 8				34,100	53,530	1.00						Mn .38	
				35,350	55,490	1.50						S .030	
12777				35,350	55,490	2.40	30.0	.780	.280	.218	65.8		
D	1.160	.567	.658	22,200	33,740	Elastic limit.							Butt Strap.
15 & 16				31,200	47,410	.50							
C 9 to 16				36,750	55,840	1.00							
				36,750	55,840	1.50							
12777				36,750	55,840	2.30	28.7	.770	.300	.231	64.9		

Test of Steel Plate—Continued.

Marks.	Measurements			Applied Load.	Strain in pounds per sq. inch.	Elongation In Eight Inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Percentage		
E 1 & 2	1.245	.447	.557	18,100	32,490	Elastic limit.						C .17	Butt Strap.
				27,200	48,830	.50						P .012	
J 1 & 2				30,200	54,210	1.00						Mn .44	
				31,300	56,180	1.50						S .030	
12605				31,300	56,180	2.60	32.5	.840	.225	.189	66.1		
E 3 & 4	1.210	.430	.520	16,700	32,110	Elastic limit.							Steam Dome.
				24,500	47,110	.50							
J 3 & 4				26,600	51,150	1.00							
				27,860	53,570	1.50							
13121				27,860	53,570	2.30	28.7	.850	.220	.187	64.0		
G 1 to 4	1.245	.501	.624	20,700	33,170	Elastic limit.						C .16	Steam Dome.
				34,300	54,960	.50						P .007	
F 1 to 4				36,200	58,000	1.00						Mn .36	
				37,200	59,610	1.50						S .029	
12771				37,200	59,610	2.40	30.0	.880	.290	.255	59.1		
H 1	1.190	.882	1.050	36,800	35,040	Elastic limit.						C .18	Heads.
				54,300	51,700	.50						P .007	
8579				57,200	54,470	1.00						Mn .39	
				58,000	55,230	1.50						S .029	
				58,000	55,230	2.32	29.0	.790	.540	.427	59.3		

Test of Steel Plate—Continued.

Marks.	Measurements.			Applied load.	Strain in pounds per sq. inch.	Elongation in eight inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Percentage		
H 2	1.190	.879	1.046	33,700	32,210	Elastic limit.							Heads.
8579				54,700	52,290	.50							
				57,950	55,400	1.00							
				58,100	55,540	1.50							
				58,100	55,540	2.36	29.5	.800	.540	.432	58.7		
H 3	1.185	.815	.966	31,900	33,020	Elastic limit.							Heads.
8579				49,800	51,550	.50							
				53,260	55,130	1.00							
				53,660	55,540	1.50							
				53,660	55,540	2.22	27.7	.850	.500	.425	56.0		
H 4	1.170	.874	1.023	35,400	34,600	Elastic limit.						C .16	Heads.
13460				52,900	51,700	.50						P .007	
				57,000	55,710	1.00						Mn .32	
				57,000	55,710	1.50						S .035	
				57,000	55,710	2.40	30.0	.790	.540	.427	58.3		
I 1	1.235	.814	1.005	31,900	31,740	Elastic limit.							Heads.
12793				52,500	52,240	.50							
				54,950	54,670	1.00							
				54,950	54,670	1.50							
				54,950	54,670	2.00	25.0	.840	.460	.386	61.6		

Test of Steel Plate—Continued.

Marks.	Measurements.			Applied load.	Strain in pounds per sq. inch.	Elongation in eight inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Per-centage		
I 2	1.165	.815	.950	33,400	35,160	Elastic limit.							Heads.
12793				50,000	52,630	.50							
				54,000	56,840	1.00							
				54,900	57,790	1.50							
				54,900	57,790	2.24	28.0	.820	.530	.435	54.2		
I 3	1.180	.817	.964	33,100	34,340	Elastic limit.							Heads.
13460				52,400	54,350	.50							
				55,100	57,160	1.00							
				55,800	57,880	1.50							
				55,800	57,880	2.28	28.5	.870	.520	.452	53.1		
J 4	1.140	.814	.928	32,700	35,230	Elastic limit.							Heads.
8579				49,100	52,900	.50							
				51,950	55,970	1.00							
				52,660	56,740	1.50							
				52,660	56,740	2.34	29.2	.870	.550	.420	52.7		
K 1, 2, 3,	1.130	.615	.695	23,900	34,380	Elastic limit.						C .18	Combustion chamber.
12716				33,000	47,480	.50						P .0118	
				36,800	52,940	1.00						Mn .32	
				38,300	54,960	1.50						S .036	
				38,300	54,960	2.24	28.0	.740	.330	.247	64.5		

TABLE I.—*Monthly Pre*

			Pr[illegible]aminy Series.	
	U. S. Weather Bureau.	Water Bureau	Forks of Neshaminy.	Doylestown.
Elevations are in Feet Above Sea Level.	207	6[illegible]	143	405
1900	Precipitation in Inches.	Precipitation	Precipitation in Inches.	Precipitation in Inches.
January	3.34	3[illegible]	3.53	.....
February	3.71	3[illegible]	4.58	.....
March	3.13	2[illegible]	2.96	.....
April	1.93	2[illegible]	2.43	.....
May	4.11	4[illegible]	7.60	.....
June	2.82	2[illegible]	5.57	.....
July	2.77	3[illegible]	6.12	.....
August	3.95	3[illegible]	2.62	.....
September	6.31	6[illegible]	3.07	.....
October	3.00	3[illegible]	2.69	.....
November	3.42	3[illegible]	2.94	.....
December	2.41	2[illegible]	2.30	.....
Total	40.90	3[illegible]	46.41	.....
Percentage	100		113	.....
18 years yearly average. Inches	39.26	4[illegible]	45.52	.....
18 years yearly average. Percentages	100		116	.....
Average deficiency or increase, 1900	1.64	[illegible]	0.89	.....
Percentage deficiency or increase	4		2	.....

Test of Steel Plate—Continued.

Marks.	Measurements.			Applied load.	Strain in pounds per sq. inch.	Elongation in eight inches.		Reduction of Area.				Chemical analysis.	Remarks.
	Breadth.	Width.	Area.			Elongation in inches.	Elongation in percentage.	Breadth.	Width.	Area.	Per-centage		
K 4, 5, 6.	1.125	.595	.669	21,200	31,680	Elastic limit.							Combustion chamber.
				31,900	47,680	.50							
12716				36,200	54,110	1.00							
				38,000	56,800	1.50							
				38,000	56,800	2.42	30.2	.760	.320	.243	67.3		
K 7 & 8.	1.125	.605	.681	22,300	32,740	Elastic limit.						C .13	Combustion chamber.
				37,000	54,330	.50						P .023	
5661				39,900	58,590	1.00						Mn .44	
				39,900	58,590	1.50						S .030	
				39,900	58,590	2.42	30.2	.770	.360	.277	59.3		
L 3 & 4	1.115	.625	.697	21,700	31,130	Elastic limit.							Combustion chamber.
				30,500	43,750	.50							
M 3 & 4.				36,100	51,790	1.00							
				37,800	54,230	1.50							
12777				37,800	54,230	2.64	33.0	.725	.330	.239	65.7		
M 1 & 2.	1.130	.620	.701	21,800	31,090	Elastic limit.							Combustion chamber.
				30,500	43,500	.50							
L 1 & 2.				36,900	52,630	1.00							
				38,550	54,990	1.50							
12777				38,550	54,990	2.32	29.0	.745	.325	.242	65.5		

TABLE II.

Rain Storms Exceeding in Rate 0.25 Inches per Hour as Recorded by the Automatic Rain Gauge at Philadelphia for the Year 1900.

Date of Observation.	Automatic Rain Gauge.					Remarks.
	Total Fall.		Maximum Fall.			
	Amount in Inches.	Duration—Hrs. Min.	Amount in Inches.	Duration in Minutes.	Rate per hour during Maximum Fall.	
January 12th, rain storm.....	1.86	16—00	.35	60	.35	
April 18th, rain storm.....	1.00	19—55	.35	20	1.05	
May 18th and 19th, rain storm..	2.98	32—30	.57	25	1.37	
June 2d, shower.....	.22	2—35	.13	15	.52	
June 3d, shower.....	.57	4—05	.45	12	2.25	
June 27th, shower.....	.38	1—35	.30	20	.90	
July 8th, shower.....	.25	2—05	.20	20	.60	
July 12th, shower.....	.88	6—15	.45	30	.90	
July 30th, shower.....	.94	10—45	.40	25	.96	
August 7th, shower.....	.48	1—30	.45	20	1.35	
August 17th, shower.....	.57	2—40	.50	20	1.50	
August 27th, shower.....	.42	4—20	.38	55	.41	
September 16th, rain storm....	3.25	15—00	1.75	90	1.17	
October 14th, rain storm.....	1.82	15—20	.52	20	1.56	
November 2d, shower.....	.35	7—10	.23	20	.69	
November 25th, rain storm....	2.44	34—40	.55	60	.55	

TABLE III.

Rain Storms Exceeding in Rate 0.25 inches per Hour as Recorded by the Automatic Rain Gauge at Forks of the Neshaminy for the Year 1900.

Date of Observation.	Automatic Rain Gauge.					Remarks.
	Total Fall.		Maximum Fall			
	Amount in Inches.	Duration—Hrs. Min.	Amount in Inches.	Duration in Minutes.	Rate per Hour during Maximum Fall.	
February 13th, snow and rain.	1.52	22—00	.25	40	.37	
April 23d, shower	.26	0—30	.26	15	1.04	
May 19th, rain storm	6.08	19—10	4.33	240	1.08	Very heavy local rain.
May 19th, rain storm	6.08	19—10	3.53	120	1.76	
June 2d, shower	.52	1—00	.49	40	2.73	
June 12th, shower	.30	10	.30	10	1.80	
June 14th, shower	.36	1—00	.25	12	1.25	
June 27th, shower	4.00	6—20	3.20	96	2.00	Very heavy local rain.
July 7th, shower	.86	1—25	.85	36	1.42	
July 8th, shower	.42	1—45	.39	15	1.56	
July 12th, shower	.41	0—50	.30	15	1.20	
July 26th, showers	1.03	10—25	.73	20	2.19	
July 30th, shower	1.55	9—35	.75	25	1.80	
August 13th, shower	.68	2—00	.35	15	1.40	
August 23d, shower	.62	4—55	.25	8	1.87	
August 29th, shower	.40	1—00	.35	40	.53	
September 16th, rain storm	1.82	13—10	.60	48	.75	
September 30th, rain storm	1.15	27—20	.30	25	.72	

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 1900.

Date of Observation.	Automatic Rain Gauge.					Remarks.
	Total Fall.		Maximum Fall.			
	Amount in Inches.	Duration Hrs. Min.	Amount in Inches.	Duration in Minutes.	Rate per Hour during Maximum Fall.	
January 12th, rain storm	1.23	11—15	.40	28	.85	
May 19th, rain storm	1.65	17—25	.34	20	1.02	
June 2d, shower	.54	1—55	.48	24	1.20	
June 8th, shower	.30	1—10	.25	15	1.00	
June 11th, shower	.47	0—33	.43	15	1.72	
June 27th, shower	1.54	7—10	.54	25	1.29	
July 3d, shower	.22	0—45	.20	15	.80	
July 4th, shower	.38	0—30	.38	25	.84	
July 12th, shower	1.16	1—30	1.15	36	1.92	
July 23d, shower	.42	4—05	.20	15	.80	
July 25th, 26th, rain storm	2.63	21—15	.75	20	2.25	
July 26th, rain storm	2.63	21—15	.28	15	1.12	
August 7th, shower	.55	0—45	.54	25	1.10	
August 12th, shower	.25	1—00	.20	20	.60	
August 15th, shower	.38	0—15	.38	15	1.52	
August 18th, shower	1.24	2—45	.80	15	3.20	
August 26th, shower	1.05	0—30	1.00	25	2.40	
August 29th, shower	.24	0—30	.20	12	1.00	
November 24th, 26th, rain st'm.	1.19	53—20	.33	35	.56	

KON WATERSHEDS.

WISSAHICKON.

EA OF WATERSHED, 64.6 SQUARE MILES.

	Percentage showing run-off	Monthly Yield of Stream.	Average Daily Yield of Stream.		Average yield in cubic feet per second per square mile.
		Cubic Feet.	Cubic Feet.	Gallons.	
October					
November					
December					
January					
February					
March					
April					
May					
June					
July	20	113,477,760	3,660,573	27,457,886	0.656
August	17	94,227,840	3,039,608	22,690,521	0.545
September	10	66,242,880	2,208,096	16,517,704	0.396
Total					
October	23	92,067,840	2,970,000	22,218,142	0.532
November	20	74,770,560	2,492,352	18,644,087	0.447
December	30	111,291,840	3,590,060	26,855,512	0.643
Total					

NINETY-NINTH ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE YEAR ENDING DECEMBER 31, 1901

AND

THIRD ANNUAL MESSAGE

OF

SAMUEL H. ASHBRIDGE

MAYOR OF THE CITY OF PHILADELPHIA

WITH

ANNUAL REPORT

OF

WILLIAM C. HADDOCK

Director of the Department of Public Works

ISSUED BY THE CITY OF PHILADELPHIA
1902

PHILADELPHIA
DUNLAP PRINTING CO., 1332-36 CHERRY STREET
1902

OFFICE OF THE MAYOR

PHILADELPHIA

Mayor
SAMUEL H. ASHBRIDGE

Secretary
ARTHUR R. H. MORROW

Chief Clerk
GEORGE W. SEEDS

Contract and License Clerk
JOSEPH F. JONES

Stenographer
JEANNE L. LOCKE

Clerk
WILLIAM W. GAMBLE

Ass't Stenographer and Typewriter
GEORGE A. WELSH

Messenger
WALKER B. WEBB

Secretary Civil Service Board
ROLLA DANCE

Stenographer
JOSEPH MARCUS

Clerk
WILLIAM WEAVER

THIRD
ANNUAL MESSAGE

OFFICE OF THE MAYOR, CITY HALL,

Philadelphia, April 1, 1902.

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

GENTLEMEN:—In pursuance of the requirements of the Act of Assembly of June 1st, 1885, I have the honor to transmit herewith my third Annual Message, accompanied by reports from the following departments of the city government, to wit: Department of Public Safety, Department of Public Works and Department of Charities and Correction, together with reports from the Receiver of Taxes, City Treasurer, City Controller, Law, Education and Sinking Fund Commission.

A vacancy in the Board of Directors of the Department of Charities and Correction, caused by the resignation of Albert H. Dingee, was filled by the appointment of Hon. John M. Scott, in May.

DEPARTMENT OF PUBLIC SAFETY.

The high standard of the various Bureaus of the Department of Public Safety, has been maintained under the direction of Abraham L. English, who has given unremit-

tant attention to the duties of his office. The prevalence of smallpox and other contagious diseases, an epidemic of which was at one time threatened, has demanded greater activity and vigor than ever before, and good citizens cannot fail but to derive satisfaction from the study of the details of the very full reports of his Department and Bureaus under his jurisdiction. Touching so closely the health, life and property of all our people as do the Bureaus in this important Department, the reports cannot fail of commendation.

Bureau of Health.

Although during the year 1901, smallpox was to some degree prevalent in the city, as it was throughout the entire United States. It is gratifying to note that the death rate, with the exception of one year, was the lowest reported in this city since 1879, it being 18.26 per one thousand of population, or, one death in each 54.74 living persons. This percentage is considerably less than the average death rate, which was recently about twenty to one thousand of population.

The history of smallpox, which at one time threatened to become epidemic in this city, and was only checked by the intelligent and scientific work of the Department of Public Safety and Bureau of Health, is interesting as showing how negligence on the part of physicians, or carelessness on the part of the people, may bring about a serious condition.

In December, 1900, there was not a known case of smallpox in Philadelphia. In January, however, appeared a sporadic case in West Philadelphia, and in February another in the southern section of the city. These cases were isolated and no infection occurred. In the following March, however, a resident of the Thirty-seventh Ward developed a mild case of smallpox upon his return from a

visit to Altoona, where he had stopped at an infected house. He neglected to send for a physician. Subsequently his wife had a light attack, and later one of the sons, whereupon the family became alarmed and sent for a physician. Meanwhile, the family had been receiving visitors and making visits. The third case was diagnosed as smallpox and sent to the Municipal Hospital, but in spite of isolation and other sanitary precautions, another son and daughter took the disease. These two latter and the first son attacked, all died. From that time on smallpox spread all over that section of the city, although it is probably the best sewered and best paved and cleanliest section of our municipality.

Toward the close of the year, when cold weather set in, the danger of a further spread of the disease was, of course, enlarged. By means of a liberal appropriation on the part of your Honorable Bodies, which enabled the Department to take every precaution known to sanitary science, however, smallpox was kept within bounds. A special corps of vaccine physicians was organized, while each district had likewise its quota of vaccine experts. It is probable that fully five hundred thousand successful vaccinations were made up to the first of this year. In addition, the disinfecting corps was largely increased by the employment of many temporary assistants, and these were supplied with the very latest and most approved form of disinfectants. In addition to this, every infected house was placed under quarantine guard. These precautions proved so effectual that the dread disease was kept within bounds.

In this connection I cannot do better than to refer to the recommendation of Dr. William M. Welch, who is recognized as the very highest authority upon infectious diseases and the efficacy of vaccination, and I will quote the report of the Director of the Department, as follows:

"I believe it is absolutely necessary for the health of

this community that an Act of Assembly should be passed requiring compulsory vaccination and revaccination. The time taken in the operation is so slight and the effects in the way of suffering not such as to prevent the transaction of business, that there is no good reason why every individual should not be submitted to vaccination. A public record should be kept of these vaccinations, and every person should be required to be revaccinated at each recurring five years, or as often as necessity therefor shall arise. The question of revaccination is a very serious one in the public schools, and frequent inspection should be made in order to see that the children are free from the symptoms of disease. A simple statement of fact, that not a single case of a recently and successfully vaccinated person has been admitted, to the Municipal Hospital suffering from smallpox, together with the record of two hundred vaccinated employees, physicians and nurses, at the Municipal Hospital, not one of whom has been stricken with it, is ample and practical proof of the efficacy of vaccination."

In this connection I would refer to the many improvements made in the Municipal Hospital during the year, made possible by the wise legislation of your Honorable Bodies, and which has enabled the Department to take such precautions as it has.

A committee of your Honorable Bodies during the closing quarter of the past year examined many proposed sites for the re-location of the Municipal Hospital. Many unexpected difficulties were encountered as no locality desired to have the institution near them because of the fear of the contagion, so that the committee found it impossible to recommend a desirable location. I feel confident, however, that at an early date not only will a suitable site be found and purchased, but that the new buildings will be begun.

Bureau of Police.

The report of the Bureau of Police would indicate that crime is decreasing, there having been 4,441 less arrests in 1901 than in the preceding year, which is accounted for by the very large percentage of decrease in reports of the lesser forms of crime.

A satisfying incident of the report is that there was a decrease of 774 in the number of arrests for intoxication and disorderly conduct.

The operation of the present laws governing the license of saloons has been so satisfactory as to lead to the conclusion that it would be unwise to amend or repeal the laws as now laid down upon the statute books of the State. While a sister city is distracted upon the question of Sunday liquor selling, the experience of Philadelphia goes to prove that it is better for the interests of the community that there should be one entire day in the week when liquor cannot be openly and legally sold. In this conclusion of the Department, I heartily concur feeling convinced that no other one thing tends so much to conserve the peace and quiet of the Sabbath day.

The enlargement of the staff of the Fire Marshal a year ago, has produced admirable results and this branch of the work has proven itself a very valuable adjunct to the work of the Bureau.

As in my previous messages to your Honorable Bodies, I am constrained again to dwell upon the necessity for enlarging the force of the meat and cattle inspectors. The slaughter of animals for food purposes is continually increasing each year by a large percentage, yet for many years there has been no increase in the number of inspectors. This matter concerns the health of our people so closely that it is one of serious moment to the Executive Departments of the City. Too many safeguards can-

not be thrown around the inspections of meats and an adequate force of inspectors should be employed.

Bureau of Fire.

Philadelphia still stands pre-eminent among the cities of the Union for the skill, efficiency and fidelity of the men connected with the Bureau of Fire. The Bureau is entitled to the very highest commendation for the protection of life and property. The constant growth of the City adds annually about five or six thousand dwellings or stores, thereby extending the area to be protected by the outlying companies and the continuous increase in our population makes the demand, urgent, for an increase in the number of men and apparatus in this Bureau so as to afford even more ample protection against fire.

Building Inspection.

The report of this important Bureau of Building Inspection exhibits a most satisfactory increase in the growth of the City and in the value of the buildings erected, the latter exceeding by $1,250,000 that of the highest record of any previous year in the City's history and exceeding that of 1900 by nearly $9,000,000. There has been some discussion recently regarding the construction of fire proof buildings. It can be said in commendation of the work of this Bureau that every Act of Assembly and Ordinance of City Councils have been rigidly enforced in the approval of plans for new buildings and for alterations to old ones. If any criticism can be made, it is that the requirements of the law are not strict enough and it might be wise were the Legislature to extend legislation in the direction of requiring greater structural protection against fire. The tendency of the present day is to erect towering office and apartment buildings, known as "sky scrapers," independent of the condition of sur-

rounding properties. While the present law, when drafted, was a stride in advance and was deemed fully competent to deal with such a problem, yet later experience has shown the need of still greater restrictions and requirements.

Electrical Bureau.

Under the efficient management of the new Chief of the Electrical Bureau, the high standard established by his predecessor has been maintained. The most important recommendation by the Bureau is that authority should be given by your Honorable Bodies to the Bureau to supervise the introduction of electricity into business and private houses. At present installations of electrical apparatus are made without supervision or inspection, in many cases by individuals who have had no special training in this important work and in some cases by those who give indifferent attention to the matter. The danger from fire and from, perhaps, fatal accidents, is thus increased. This is a matter that should commend itself to your judgment for legislative action, which I am certain would be favorably received by manufacturers and others owning large establishments.

Frequently during the winter season heavy falls of snow accompanied by freezing rain and sleet caused great destruction to the police and fire wires, and in fact to the telegraph, telephone and electric lighting wires as well. Some years ago your Honorable Bodies made liberal appropriations for the extension of the underground system. This policy should be continued for I deem it of great importance that the wires of the municipality in all the Departments, wherever it is practicable, be placed under ground.

A number of severe storms have occurred in recent years which has placed various Bureaus in the Department to

a great disadvantage and serious loss. This is especially applicable to the Bureaus of Police and Fire, where prompt communication should at all times be had.

Bureau of Boiler Inspection.

The Bureau of Boiler Inspection continued during the year 1901 to be self-sustaining, its revenue being nearly double the original appropriation for its maintenance. On December 31st, the Department had under its care more than three thousand boilers, while the combined Insurance Companies had a little more than four thousand. Nearly three thousand engineers were examined upon application for license.

Bureau of City Property.

On July 1st, 1901, in pursuance of an Act of Assembly which abolished the Public Buildings Commission the City Hall came under the jurisdiction of the Bureau of City Property. A thorough reorganization of the force of employees was effected whereby the cost of maintenance has been greatly reduced and greater efficiency attained. The force of watchmen was transferred to the Bureau of Police and organized into what is known as the City Hall Squad, under full police regulations, including trial by a Board of Inquiry prior to discharge.

The Bureau, by Ordinance of Councils, has purchased $160,400 worth of property for patrol, bath, fire and police purposes and has expended nearly $2,000,000 in making permanent improvements.

During the year permanent improvements were completed in a number of squares and small parks throughout the City, thus beautifying and giving breathing spaces to the sections where they are located.

A very handsome and commodious pier was completed and opened at Race street wharf on the Delaware river,

last September, and was immediately patronized by many hundreds of people residing along the river front, giving relief to a congested district where small parks are impracticable.

In addition to the recreation pier on the upper deck, the Police and Fire boat crews occupy part of the lower deck of the pier, and the City has leased to the Merchants' and Miners' Transportation Company, running steamers to Savannah, Georgia, the upper side of the pier, thereby bringing the City a handsome revenue which is more than sufficient to pay the interest charges upon the entire improvement.

DEPARTMENT OF PUBLIC WORKS.

During the past year a greater amount of work has been performed upon permanent public improvements by the various Bureaus of the Department of Public Works, than in any one year of our previous history as a city. This is shown in the Annual Report of William C. Haddock, Director of this Department, who has given close and constant attention to all the many details of the various branches of civic improvement. The total amount expended for permanent improvements during the year 1901 was $5,334,844.46.

This work was done under authority of City Councils, and included paving, grading and opening of streets, the removal of rubble and cobble paving and its replacement with improved paving; the building of main and branch sewers; the construction of new bridges; the laying of water mains, together with the installation of the improved water service.

Bureau of Water.

The report of Frank L. Hand, Chief of the Bureau of Water, which incidentally is the one hundredth annual re-

port of the Bureau of Water, shows that improved methods of conducting the business of the Bureau has brought about a large decrease in the former extraordinary consumption of water, in what has heretofore been known as waste. Comparing last year with the first year of the present administration, the decrease was 3,685,710,329 gallons. In the early part of the year 1899 there were about 300,000,000 gallons of water consumed and wasted daily. Through the able administration of Chief Hand this has been brought down to less than 280,000,000 gallons during last year, notwithstanding many thousands of dwellings and other buildings have been added, which would naturally increase the consumption.

The receipts last year were increased $207,483.25, while the current expenses increased only $62,617.64. The latter was due to the increase of force necessary to operate the additional machinery, the cost of labor of laying mains, the higher prices paid for coal and other incidental expenses.

The reduction in the quantity of water consumed does not represent a decrease in the supply to consumers, as there was a higher pressure and greater volume of water than ever heretofore maintained.

The total receipts of the Bureau for last year amounted to $3,331,437.45. The receipts for the past three years amounted to $9,704,586.89. For the previous corresponding period, to wit: 1896, 1897, 1898, $8,916,156.64, showing an increase during the past three years of $788,430.25. The net surplus of receipts over expenditures for the last three years amounts to $2,120,611.22. This covers all expenditures both for permanent improvements as well as the cost of maintenance. During this period very great extensions and additions have been made, new engines, boilers, boiler and engine houses, distributing mains and many other expenditures. It also includes the laying of mains of the Independent High Pressure Fire Service.

The introduction of the system of filtration in this City to furnish purer water in ample quantities to meet all the demands is the greatest public work ever undertaken by any municipality, and when completed Philadelphia will be far in advance of any city in the civilized world. The work has required the highest engineering skill in protecting and safeguarding the City against any loss in constructing and installing a system that will be absolutely practicable in its operations and beneficial in its results. Work at the upper Roxborough and Belmont systems was practically suspended during the winter. At each of these locations, however, the work will be pushed to a rapid completion. When it is considered that in the city of Albany, one of the first to introduce sand filtration, the entire volume of water furnished to that city is about 15,000,000 gallons per day, while at the Upper Roxborough system alone, more than 20,000,000 gallons daily will be supplied to Chestnut Hill, Mt. Airy and Germantown, an idea of the magnitude of the work can be obtained. The time for the completion of the work at Albany was twice the period that will be consumed in the completion of the Roxborough system.

The expert engineers in their report made allowance only for 27,000,000 gallons a day in West Philadelphia, but since their report several thousands buildings have been erected and many thousands have been added to the population, making the consumption of water in West Philadelphia at the present time 30,000,000 daily. The engineers in charge of the filtration work have very wisely made other plans, not only to meet the immediate demands in this territory, but so that when completed the Belmont system will furnish 60,000,000 gallons per day. This will meet every requirement of the City west of the Schuylkill river for practically forty years to come. It was thought by the engineers, not only to be wise but cheaper

for the extended work to be done now instead of having to duplicate the system ten to twenty years hence, which would cost as much more for construction.

The expert Commissioners report allowed but for 200,000,000 gallons of filtered water daily to be furnished throughout the entire City, which was only two-thirds of the amount which was being consumed at the time of their report. At each of the systems now under process of construction, the engineers in charge are developing their plans to meet every demand and requirement for thirty to fifty years in the future. The wisdom of this is apparent to every reasoning mind, and in years to come the City will save a great deal of additional money that would then be required to be appropriated.

Never in the history of our City has so important a work confronted the people as that of the filtration of the water. It touches the very health and life of the community, and much greater attention has been given to this important subject than to perhaps all of the other matters of municipal improvements combined. I do not believe but a small percentage of our citizens recognize the stupendous task taken up by the engineers in charge of the work. Its magnitude as well as the beneficial results will only be appreciated by the public when the work is completed and our City will possess the largest, purest and best water system in the civilized world.

The uncompleted part of the contract for laying the fire main service in the central portion of the City which was interrupted about December 1st will be taken up early and soon finished. The $300,000 contained in the Loan Bill for this purpose will be contracted for as soon as your Honorable Bodies direct the authorization of the loan. It is the intention of the Department of Public Works to introduce gas as fuel instead of coal. The estimates made show a great reduction in cost of maintaining the

system, both in the cost of fuel as well as labor. When the system is completed and put in service it will prove a most valuable adjunct to the Bureau of Fire in subduing conflagrations, saving from great losses, and a more ample protection to human life.

The reinspection of the entire City which was inaugurated by my direction in May, 1900, was completed in August, 1901. Instead of large salaries for inspectors, there was a corps of men appointed on the per diem roll at $1.75 per day. These men made 248,226 inspections, by means of which 40,418 properties were discovered having appliances for which no water rents were being paid, a great majority of them not having paid any water rent for from ten to twenty years. The total number of delinquent appliances revealed by the inspection was 70,660. The water rent chargeable in these fixtures amounted to $146,057.35 per year, which will hereafter be annually added to the receipts of the Bureau as a permanent income. The total amount during the period of years that the ordinance of City Councils was not enforced and for which the City did not receive one dollar was $2,500,000. The cost of the entire work of reinspection was $26,447.76, showing a net revenue the first year of $119,609.59. Each succeeding year the City will be benefited by the entire gross amount.

Surveys.

The report of Chief Engineer Webster shows that the total expenditures for the year were $1,650,741.84. Of this amount $1,394,309.39 were expended for permanent improvements such as main and branch sewers. Owing to the early distribution of the money by your Honorable Bodies the work last year was begun at an early date and the greater portion of it completed during the year. Chief Webster strongly urges the reconstruction of larger sewers where sewers already exist, there being many places in

the City where the sewers are incapable of carrying off the surface water, thereby flooding dwellings, stores and destroying a great deal of property. The authorization by loan of $1,000,000 by this Bureau, will be very well expended in partially relieving some of these conditions.

The enlargement of the testing laboratory in the Bureau has brought forth most beneficial results. Councils appropriated $5,000 for more complete equipment for making tensile, compressive and transverse tests of all kinds of materials, and this has been expended wisely. Testing in connection with the construction of the filters for the improvement, extension and filtration of the water supply has been conducted in this laboratory. The tests are most elaborate and exhaustive on samples of brick, sand, concrete, clay and every material that enters into the construction of municipal work. The report of the chief exhibits very satisfactory results, the character of materials furnished being better than at any previous period.

A number of new bridges, thirteen in all, were ordered constructed during the year. Some of these have been completed, while others are in course of construction.

An appropriation of $250,000 was given by your Honorable Bodies early last summer for dredging the Delaware and Schuylkill rivers. The specifications required that all excavated material should be placed upon League Island Park within impounding banks and above tide water, so there should be no possibility of its again being washed by the tides out into the river and creating shoals. The preliminary work has all been completed. The winter, however, setting in early, interfered with the dredgers' working. As soon as the river is open, this improvement will be vigorously pushed to a completion, and three or four of the most obstructive shoals in the river between Chester and Philadelphia will be removed, thereby giving freer access to commerce and navigation.

Chief Webster recommends legislation to fix a reasonable charge for the examination of books of his Bureau. They become greatly worn and even mutilated by the handling of hundreds of people who exercise no care in the examinations. The examinations are not made by the general public, but are used instead of credit agencies, to ascertain the standing of individuals who desire opening credit accounts with stores. Mr. Webster recommends that a small charge be fixed for examinations just sufficient to pay for the renewal and rewriting of the books, which, at the present time, is a charge upon the municipality without any revenue in return. In this recommendation I most heartily concur.

Highways.

More than one-fifth of the entire amount of improved pavements in the whole city has been laid during the first three years of the present administration. Last year sixty-one miles of improved pavement were laid by the Bureau of Highways. This made a total during the three years of the present administration of 192 miles. The total amount of improved pavement in the City is little more than 839 miles. During the year the Bureau has entered into 558 contracts for paving, repaving, grading and miscellaneous improvements.

Highway Supervisors.

The Board of Highway Supervisors issued 1,468 permits to companies maintaining underground structures, and the report of the Board shows that the outlook for the cessation of the opening of streets under such contracts is very unpromising. The Board says that the only remedy for this condition seems to be in the construction of underground subways within which pipes of all kinds can be placed. The plans made by the draughtsmen of

the Board are becoming increasingly valuable, especially in the older sections of the City, as they show at a glance all of the underground structures. This Board is more than self-sustaining, its total revenues during 1901 being $27,722.06, being $16,552.45 in excess of all expenditures.

DEPARTMENT OF CHARITIES AND CORRECTION.

Under the wise and progressive administration of the present directors of the Department of Charities and Correction, many improvements have been started during the year, while the administration of the institutions under their charge has been marked by great care and discretion. The enlargement of the medical staff of the Philadelphia Hospital and the increased facilities afforded for clinical teaching, have already worked much good, while the Children's Hospital, the Maternity Home, and the Hospital for Skin and Venereal Diseases, upon which work has been commenced and is being rapidly pushed, will do much to relieve the crowded condition of the institution as at present constituted. These new buildings are the first of a group to be constructed of the most modern design—an improvement which will make the Philadelphia Hospital a model institution of its kind.

The House of Correction was established thirty years ago as a reformatory for the lessor forms of vice. Thousands of commitments were made, but discharges were easily obtainable through the influence of friends. Instead of the inmates being kept employed, idleness prevailed and it finally became more of an institution for recuperation from drunkenness than for the reformation of vice. With the consent of the directors of this department, I took personal charge of the institution and

issued certain instructions and directions to the general superintendent. Men who were known as chronic offenders, and who had served many terms, were placed at the hardest and most laborious work upon the meadow lands, digging ditches and building embankments. Discharges of prisoners became rare, and many of the inmates, finding they were obliged to perform hard labor, were cured of intemperate habits, and the census at the close of the year showed that the population of the institution had decreased for the year between four and five hundred, thus not only effecting a saving in cost to the City, but bringing about a moral regeneration of many who had been heretofore chronic inmates.

The appropriation of $80,000 which has been given by your Honorable Bodies for the erection of a hospital for consumptives will enable the Board to erect a building containing eight wings, of steel and glass, practically germ proof. The roof and sides will work on pivots so that fresh air and sunlight will be admitted in abundance, while ozone will be generated by electrical appliances. There are at present four hundred and thirty-two cases of consumption distributed throughout the hospital, a condition which is a constant menace to the health of every individual inmate. The crowded condition of the wards, the lack of exercise and ventilation, only hastens the process of this dread pulmonary disease. Pavilions for the treatment of this disease have long been required, and the result of separating the consumptives from the other inmates will prove most beneficial. The Board of Directors, in company with a committee of our most eminent medical specialists, visited New York and Boston during the past year and are most earnest in their recommendations for the separation of the insane, sick and indigent. The directors, as well as a committee of physicians, visited and examined various localities for the

establishment of departments for the Almshouse proper and for the insane. An appropriation has been made by your Honorable Bodies and doubtless at an early date a site will be recommended and submitted for your consideration for the location of these institutions.

There are many insane patients from this city located in various State asylums. With the erection of a large and modern institution for the insane, much money now appropriated for their maintenance elsewhere will be saved to the city. I cannot too strongly recommend the most prompt action to carry out the recommendations of the Board of Directors of this institution, which appeals to the sympathy and demands the active co-operation of all citizens.

DEPARTMENT OF EDUCATION.

I would respectfully call the attention of your Honorable Bodies to what in my judgment is the most important branch of the public educational system in this city, the manual training schools. There is a call for a wider development of these schools wherein thousands of boys are taught useful and valuable trades. The statistics of the Northeast Manual Training School, for instance, show that the applications from manufacturers and other employers of skilled mechanics, for graduates of this institution, outnumber many times the number of graduating pupils. I am convinced that no branch of the system of public education in Philadelphia does more to open up the future before ambitious boys than do the manual training schools. Recently an appropriation was made for the purchase of a lot in the southern section of the city. The city now owns a tract of ground at Seventh street and Lehigh avenue, which is central, in a manufacturing district, and well adapted for a new manual training school. Funds for

the erection of a new building in this neighborhood should be made promptly available. The members of the Board of Education are entirely familiar with this subject and earnestly approve of the extension of this branch of teaching in the public schools. The education of the sons of our citizens to useful trades is of such importance that I hope to see at the close of the present year, new buildings under way at one, if not both, locations.

DEPARTMENT OF LAW.

The Department of Law has at all times rendered the most prompt legal advice whenever called upon, and is entitled to great praise in successfully defending and protecting the city's interests in the various suits brought by or against it.

CITY CONTROLLER.

The City Controller has won the approval of all our citizens for the careful manner in which he has scrutinized the city accounts. The finances of the city are in a highly satisfactory condition and I question whether any city in the world, with a population equal to that of Philadelphia can present any sounder financial standing.

SINKING FUND COMMISSION.

The important trust confided to the Sinking Fund Commission, under which the payment of the city debt is guaranteed, has been given the most scrupulous attention by the Commissioners.

McKINLEY MEMORIAL.

On September 7th, Philadelphia, together with the whole civilized world, was horrified by the news that William McKinley, President of the United States, had been shot by an assassin while on a visit to the Pan-American Exposition at Buffalo, New York. He lingered in agony until Saturday morning, when he expired amidst the unfeigned regret of the people of every nation. In order to give the people of Philadelphia an opportunity to express their esteem and affection for this great and good man, and their sorrow at his untimely taking off, I called at once a meeting of representative citizens, under whose auspices a memorial meeting was held at the Academy of Music on Thursday evening, September 19th. That great building was crowded to the doors, and in the streets without, thousands who had been unable to gain admission, organized impromptu services, at which the favorite hymns of the late President were sung and addresses made.

FREE LIBRARY.

The Free Library of Philadelphia has continued most satisfactorily its work of supplying literature freely to the people. It is to be regretted that the finances of the city did not permit of a more liberal appropriation to its support.

The report of the Secretary of the Civil Service Examining Boards shows that during the last year there were 327 examinations at which appeared 3,711 candidates.

Congress, at its previous session, failed to make an appropriation for dredging the Delaware river and bay. Every assurance is felt that the present Congress will make a continuous appropriation for the completion of the waterway to the Atlantic ocean in securing a channel to the depth of thirty feet. It is also to be hoped that an appropriation will be made for continuing the improvement and enlargement of League Island Navy Yard, it being the only fresh water yard in the country where vessels not in service can be laid up and with greater security and safety than at any other navy yard.

Permit me, in concluding, to express to your Honorable Bodies my deep appreciation of the cordial co-operation you accorded me throughout the year just closed. May the closing year of our relations be mutually pleasant, for it is only through mutual support and active co-operation that the interests of our city can be conserved and promoted.

Very respectfully,

SAMUEL H. ASHBRIDGE,

Mayor.

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

FOR THE

YEAR ENDING DECEMBER 31, 1901

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OFFICERS

OF THE

DEPARTMENT OF PUBLIC WORKS

Director:

WILLIAM C. HADDOCK.

Assistant Director:

HARRY W. QUICK.

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.
MESSENGER—JOHN P. JUNIOR.

Superintendent of City Ice Boats:

JAMES S. JEFFERSON.

Chiefs of Bureaus:

GAS—DR. N. WILEY THOMAS.
HIGHWAYS—WILLIAM H. BROOKS.
LIGHTING—JOHN J. KIRK.
STREET CLEANING—SYLVESTER H. MARTIN.
SURVEYS—GEORGE S. WEBSTER.
WATER—FRANK L. HAND.

FIFTEENTH ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS

WILLIAM C. HADDOCK, Director

Philadelphia, January 2, 1902.

HON. SAMUEL H. ASHBRIDGE,
Mayor of Philadelphia.

DEAR SIR:—In compliance with the Act of Assembly, I have the honor to submit the Fifteenth Annual Report of the Department of Public Works for the year ending December 31, 1901.

The expenditures of the Department during the past year for maintenance, amounted to $3,840,726 and for permanent improvements and extensions $5,334,844.46, making a total expenditure for the year of $9,175,570.46. The receipts of the Department from all sources amounted to $3,651,200.20.

The appropriations made by Councils to the Department of Public Works during the past year, have enabled us to make many improvements and extensions; the operations have been varied and the work done is far in excess of that of previous years. That which has been completed is of direct benefit to the public and the work now under construction will assist in the future advancement and prosperity of the City.

A complete record of all work will be found in the reports of the Chiefs of the several Bureaus which are hereto attached and which are worthy of a careful perusal of those desiring to become familiar with the details of our City Government, in so far as they pertain to the Department of Public Works.

The great amount of work authorized by Councils, viz.: the opening and grading of streets, the paving of new streets, the removing of the old cobble and rubble pavements and repaving with improved pavements, the building of main and branch sewers, the construction of new bridges, the laying of large water mains, the construction of reservoirs and filter beds in connection with the improvement, extension and filtration of the water supply, have made extra demands upon the officers and employes of this Department and they should be highly commended for the faithful manner in which they have met the calls for their time and labor.

The results show we have not been idle. The financial exhibits giving in detail the money paid for the work done, should satisfy the most exacting that our duties have been discharged with an eye single to the interests of the taxpayers and to secure for them the largest return possible for the money expended.

What was done during the year, is set forth in full detail in the reports of the Chiefs of Bureaus; this report, to some extent, is but a brief synopsis of the year's operations.

Bureau of Water.

Comparing the results of the first year of this administration with those of the third year, we find the consumption of water decreased 3,685,710,329 gallons; that the receipts have increased $207,483.25, while the small percentage of increase in the current expenses, due to the increase of force necessary to operate the additional machinery, cost of labor

in laying mains, also to the higher prices paid for coal, small stores and other supplies incidental to maintenance, was but $62,617.64. These figures indicate careful and economical management.

The reduction in the quantity of water consumed does not represent a decrease in the supply to consumers but a greater efficiency of the pumps. By reason of improvements made to the machinery during the past three years, the quantity of water discharged for each stroke of the pumps is greater than heretofore, therefore requiring fewer pump strokes to supply the demand and less revolutions are recorded by the engine counter. This is particularly noticeable at the Belmont and Roxborough Pumping Stations, where new and improved engines have been installed.

The introduction of the self-closing hopper closet fixture and the repairs made to a greater number of leaky fixtures during the past year, have also contributed to lessen the quantity of water consumed.

The financial statement of the Bureau of Water for the past year shows receipts amounting to $3,331,437.45, an increase of $82,242.21 over the previous year.

The receipts for the past three years amounted to..	**$9,704,586 89**
For the previous corresponding period, to wit: 1896, 1897 and 1898	**8,916,156 64**
An increase during the past three years of	**$788,430 25**

During the year 1899, the receipts of the Bureau of Water amounted to $3,123,954.20; the expenditures to $1,684,557.26, leaving a surplus of $1,439,396.94. For 1900, the receipts were $3,249,195.24; the expenditures $2,430,058.20; surplus $819,137.04. In 1901, the receipts aggregated $3,331,437.45; the expenditures $3,469.-360.21; excess of expenditures over receipts $137,922.76, leaving a net surplus for the three years of $2,120,611.22 over all expenditures both for permanent improvements and

the cost of maintenance, and this notwithstanding the fact that during the past three years we have made extensive additions and repairs to pumping stations, engines, boilers, etc., also having expended large amounts for the construction of filtration plants and their appurtenances, and for laying the mains of the independent high pressure fire service.

Improvement, Extension and Filtration of Water Supply.

The most notable feature of the report of the Bureau of Water is the progress which has been made in connection with the improvement, extension and filtration of the water supply.

In January, 1901, the entire work of the preparation of the plans and of construction pertaining to the improvement, extension and filtration of the water supply was placed under the immediate direction of Mr. John W. Hill, Consulting Engineer, with Mr. Samuel T. Wagner as First Assistant Engineer in charge of operations. The drawings and specifications prepared have been submitted to and approved by Mr. Frank L. Hand, Chief of Bureau of Water, and Mr. George S. Webster, Chief Engineer of Bureau of Surveys.

The report of this work, giving a detailed account of all operations will be found with the report of the Chief of Bureau of Water (Appendix F).

The most important legislation pertaining to this work passed during the year were ordinances to repeal the ordinance appropriating the land for the proposed filter plant at Queen Lane, and also an ordinance to appropriate a tract of land for a distributing reservoir in the Twenty-second Ward near Oak Lane.

The Queen Lane filter site recommended by the experts appointed by the Mayor in 1899 was abandoned, as further

and more exhaustive studies than they were able to give the subject have shown that it is better to supply the districts now supplied from the Queen Lane, East Park, Corinthian and Fairmount reservoirs with water from the Torresdale filter plant, and that it can be done at very much less expense. The Oak Lane reservoir is a necessary adjunct to this source of supply.

The work accomplished at the testing station located at the Spring Garden pumping Station and which was commenced in September, 1900, has been of the greatest value. The investigations are being carried on by a specially trained corps of assistants and in a thoroughly scientific manner. A testing station has also been established along the Delaware river upon the site of the Torresdale filter plant, to examine in detail the characteristics of the Delaware river water; all the analytical work of this station is being attended to in the laboratories of the testing station at the Spring Garden pumping station.

The information obtained through the investigations made at these stations has been of supreme value to the Department in the construction of the filter plants and in ascertaining the value of the various filter sands and gravel to be used in the filter beds.

Experiments have been made with a special view to increasing the rate of filtration in connection with the preliminary treatment of the water other than sedimentation.

The examination of a large number of samples of filter sands has shown that there is an abundance of local sand suitable for use. Many and special investigations have been made from time to time, both in connection with the water investigation and in the work of constructing the filters.

A number of very interesting tests have been made to determine the best proportions of clay and gravel or broken stone required in the mixing of the clay puddle which is

being used as a watertight lining to the filters, reservoirs and filtered water basins.

A very large amount of office work has been accomplished during the year. Specifications and plans have been prepared for twenty-five contracts; these plans and specifications cover the construction of eighty-six (86) filter beds, each with a net area of about seven-tenths (0.7) of an acre, and a combined capacity at a three million gallon rate of 153,700,000 gallons per 24 hours. Seven public lettings have been held for the receipt of proposals for work and materials; the sum limit of the contracts awarded amounts to $11,647,800.

The filter plants are located as follows:

	Filter Beds.	Net capacity at 3,000,000 gallon rate.
Adjacent to Lower Roxborough Reservoir, Twenty-first Ward	5	6,000,000
Adjacent to Upper Roxborough Reservoir, Twenty-first Ward	8	14,700,000
Belmont and City avenues, Twenty-fourth Ward	18	33,000,000
Delaware river, below Torresdale, Forty-first Ward	55	100,000,000
	86	153,700,000

In the preparation of the plans for all of the above mentioned plants, provision has been made for their ultimate extension to the capacities planned by the experts.

All the filter beds will be constructed entirely of concrete and cement by groined vaulting, which, in turn, will be covered with earth and top soil, sodded and seeded.

The capacities of the filters are generally based on twenty (20) per cent. of the area being out of service for cleaning. Each plant is provided with a covered filtered water basin constructed of concrete, and generally with a capacity equal to one-half the daily output of the plant.

The filtering materials are not included in the contracts for the construction of the plants. At the present time the

sand for the two plants at Roxborough is all that has been contracted for.

Reservoirs at Belmont and Oak Lane have been designed and placed under contract, with a total capacity of 143,000,000 gallons.

Three pumping engines for Lardner's Point, with a capacity of 20 million gallons each every 24 hours, and three with a capacity of 10 million gallons each, to pump the raw water from the Upper Roxborough reservoir to the Upper Roxborough filter beds, have been placed under contract.

The Torresdale filtered water conduit to carry the filtered water from the Torresdale filter plant to the pumping station at Lardner's Point, is being constructed in a tunnel generally one hundred (100) feet beneath the surface of the ground and through rock. The finished inside diameter is ten (10) feet six (6) inches, and the length between the permanent end shafts is 13,815.15 feet. In addition to the two (2) permanent end shafts nine (9) intermediate working shafts are being sunk to hasten the construction of the work. The nominal capacity of the finished conduit will be 300,000,000 gallons per day. Work has begun upon all of the working shafts and they are practically down to rock formation. Adequate plants have been established by the contractor to supply compressed air for the tunnel operations.

Distribution mains for increased service and other necessary purposes have been placed under contract, involving thirty-one (31) miles of mains, with 24,208 tons of cast iron pipe and specials. A large amount of this work is completed. Work has been started on fourteen contracts and is being conducted as expeditiously as possible.

The early advent of cold weather has somewhat delayed the work of construction, but the contractors are taking advantage of every opportunity and the work will be in

splendid condition for very substantial progress during the open weather of the current year.

The lower Roxborough filter plant, designed to supply the lower portions of Germantown and Manayunk, is rapidly nearing completion. The concrete work is completed, the pipes laid and the filters are now about ready for the filtering materials.

At Upper Roxborough the early advent of cold weather was unfortunate, as the work is in such a condition as to interfere seriously with the laying of the puddle and concrete. All excavations have been made; the work on the filtered water basin is well advanced and the pipe system is being urgently pushed.

At Belmont good progress is being made. A large amount of excavation is completed; a very considerable part of the reservoir embankment has been placed; the sewerage system completed, and the pipe lines are being vigorously prosecuted.

A forty-eight inch pipe line has been laid on Broad street, from Arch to York streets, and a large percentage of the new lines for bringing the filtered water from Lower Roxborough to Germantown and Manayunk has been completed.

The magnitude of the work which has been accomplished during the year ending December 31st, 1901, can best be realized by reference to the following statistics:

	Excavation, cubic yds.	Embankment, cubic yds.	Puddle lining, cubic yds.	Concrete, cubic yds.	Water pipe laid, tons.
Lower Roxborough filters	60,785	23,921	7,889	12,560	263.87
Upper Roxborough filters	119,149	16,500	4,845	1,984	672.1
Belmont filters	250,576	119,186	195	278	482.
Distribution pipe lines	65,051	.....	.....	.....	8,091.7
	495,561	159,607	12,929	14,822	9,509.17

Pumping Stations.

The total quantity of water pumped during the past year was 103,805,457,224 gallons. The daily average pumpage was 284,398,513 gallons, with an average daily consumption of 279,975,453 gallons, equal to 211.9 gallons per capita per day.

The new engine house at Belmont Pumping Station has been completed, and with its surroundings presents a very attractive appearance.

The Holly Manufacturing Company has completed its work of erecting the three (3) new 10,000,000 gallon pumps for this station, and they were put in active service during the month of July. A very gratifying feature of these new pumps is their economy in the consumption of coal.

The quantity of coal consumed at this station during the past year was 6,924 tons less than the previous year, which at the contract price paid for coal furnished this station, represents a money value of $17,844.80. Comparing the time the new pumps were in operation with the corresponding period of the previous year, the saving in coal amounted to forty-nine per cent., which for the entire year at the contract prices amounts to $58,521.12.

The four (4) new 5,000,000 gallon engines erected in 1900 by the Worthington Company at the Roxborough Pumping Station have been in service during the past year whenever required. They have been subjected to an endurance test lasting seventy-two (72) hours; also a duty test of foot pounds of work performed per heat unit. The results of the tests were entirely satisfactory. These new pumps like those at Belmont, have proved to be good savers of fuel. Since they have been in operation the consumption of coal at this station has decreased thirty-four per cent., which at the contract prices represents a money value of $29,481.30.

At the Frankford Station, the old No. 1 Southwark pump, which was removed from the Roxborough Station, has been re-erected upon foundations constructed by employees of the Bureau of Water; the work of re-erection has been completed and the engine put in operation November 25, 1901, since which date it has been in constant service.

The pumpage at the Queen Lane Station increased six per cent. during the past year, with a corresponding increase in the quantity of coal consumed, amounting to 3,578 tons.

The hauling of coal at this station continues to be a source of heavy expense; $9,776.50 was expended for this purpose during the past year and since 1896, it has cost $51,444.96. The cost of hauling added to the price paid, makes the coal consumed at this station more costly than that consumed at any of the other pumping stations.

We have experienced considerable difficulty at this station by reason of the breaking of pump chambers on all the engines. A number have been replaced with new castings and all the pumps are in service except No. 2, which is awaiting a new intermediate chamber.

Owing to the frequent disabling of the engines at the Queen Lane station, those at the Spring Garden Pumping Station were required to perform extra service. At the high service station, the new pumps installed in the latter part of 1900 have been in constant service throughout the year, and were subjected to both endurance and duty tests with entirely satisfactory results.

Many improvements and repairs of a minor nature have been made at all the pumping stations, and the machinery is in much better condition than it was a year ago.

High Pressure Fire Service.

Proposals for furnishing and laying the mains for this service within the area bounded by Delaware avenue and Broad street and Race and Walnut streets, were received January 22, 1901. The work of laying the mains was commenced on May 20, 1901, and has been prosecuted as expeditiously as the pipe materials could be obtained. The entire system of mains between Delaware avenue and Eighth street has been completed and tested under static head of four hundred (400) pounds to the square inch, and will be ready for service in the early part of the current year. Connections to the system have been made on the river front at Race, Arch and Walnut streets, and until the pumping station is established, the fire boats in service on the Delaware river will be utilized for forcing water through these mains.

Seventy-two per cent. of all the work has been completed, and it would have been much further advanced had we not encountered unavoidable difficulties which could neither be anticipated nor provided for.

Pipe Laying.

Forty and thirty-five one-hundreds (40.35) miles of mains of various sizes were laid during the past year, making an aggregate of 1,379.03 miles of water pipe now in use.

Included in this work was the completion of the 48-inch main from Wentz Farm reservoir with 30-inch extensions to Lehigh avenue, and the laying of a 48-inch main in Broad stret, from Arch to York streets. The laying of other mains for the betterment of the water supply in the Thirteenth and Fourteenth Wards is well under way and will be completed and in service during the early part of 1902.

Re-Inspection.

The general re-inspection of all properties in the City to ascertain the correct amount of water rent to be charged against them and which was instituted during 1900, was completed August 15, 1901. The total number of inspections amounted to 248,226. Forty thousand four hundred and eighteen properties were discovered having appliances for which no water rents were being paid. The total number of delinquent appliances revealed by the inspection was 70,660. The water rent chargeable to these fixtures amounted to $146,057.35, part of which has been collected during the past year. The cost of the work of inspection was $26,447.76, showing a net revenue to the City of $119,609.59, as the result of this re-inspection; each succeeding year the City will receive the benefit of the gross amount.

The operations of the Construction and Repair Shop continue profitable to the City, both in the character of the work done and in the greatly reduced cost at which it is supplied. The report of the Superintendent gives detailed statements of all new appliances manufactured and all repairs made.

In the year 1801, the first municipal water works were constructed at Centre Square, Broad and Market streets.

The report submitted by the Chief of the Bureau of Water is the one-hundredth annual report of the operations connected with the City's water supply. Some very interesting data is set forth in his report, showing the growth of the plant and the progress made during the past one hundred years.

The following tables give the numbers and types of engines, locations and capacities of reservoirs and a comparative summary of the operations of the Bureau of Water; also the receipts and expenditures for the years 1899, 1900 and 1901:

Statement of the Number and Type of Engines and their Several Aggregate Capacities, at the Various Stations.

Pumping Station.	Designated Number of Engine or Turbine.	Type of Engine.	Designed Capacity in Million Gallons Per Day.	Total.
Spring Garden. Old Station	5	Compound Rotary	20,000,000	
Old Station	6	Simpson's Compound Rotary	10,000,000	
Old Station	7	Marine Compound Rotary	20,000,000	
Old Station	8	Worthington Duplex	10,000,000	
Old Station	11	Gaskill	20,000,000	
New Station	9	Worthington Duplex	15,000,000	
New Station	10	Worthington Duplex	15,000,000	
New Station	2	Holly	30,000,000	
New Station	3	Holly	30,000,000	170,000,000
Queen Lane	1	Southwark	20,000,000	
Queen Lane	2	Southwark	20,000,000	
Queen Lane	3	Southwark	20,000,000	
Queen Lane	4	Southwark	20,000,000	80,000,000
Belmont	1	Worthington Duplex	5,000,000	
Belmont	2	Worthington Duplex	5,000,000	
Belmont	3	Worthington Duplex	8,000,000	
Belmont	4	Worthington Duplex	20,000,000	
Belmont	5	Holly Horizontal Compound	10,000,000	
Belmont	6	Holly Horizontal Compound	10,000,000	
Belmont	7	Holly Horizontal Compound	10,000,000	68,000,000
Belmont Auxiliary	1	Worthington	2,000,000	
Belmont Auxiliary	1	Worthington	5,000,000	7,000,000
Roxborough	2	Worthington Duplex	5,000,000	
Roxborough	3	Worthington Duplex	7,500,000	
Roxborough New House	4	Worthington Horizontal Compound	5,000,000	
Roxborough New House	5	Worthington Horizontal Compound	5,000,000	
Roxborough New House	6	Worthington Horizontal Compound	5,000,000	
Roxborough New House	7	Worthington Horizontal Compound	5,000,000	32,500,000
Roxborough Auxiliary	1	Worthington	5,000,000	
Roxborough Auxiliary	2	Worthington	5,000,000	10,000,000
Mt Airy	1	Davidson	1,000,000	
Mt Airy	2	Davidson	1,000,000	
Mt Airy	3	Knowles	1,000,000	3,000,000
Chestnut Hill	1	Knowles	250,000	
Chestnut Hill	2	Worthington Duplex	500,000	750,000
Frankford	1	Marine Compound Rotary	10,000,000	
Frankford	2	Corliss Compound Rotary	10,000,000	
Frankford	3	Southwark Rotary	22,000,000	
Frankford	4	Southwark Fdy Quarter Crank Flywh'l	15,000,000	57,000,000
Frankford High Service	1	Holly Horizontal Compound	3,000,000	
Frankford High Service	2	D'Auria Compound Duplex	4,000,000	7,000,000
Fairmount. New House	1	Turbine Wheels	2,000,000	
New House	3	Turbine Wheels	5,330,000	
New House	4	Turbine Wheels	5,330,000	
New House	5	Turbine Wheels	5,330,000	
Old House	7	Turbine Wheels	5,100,000	
Old House	8	Turbine Wheels	5,100,000	
Old House	9	Turbine Wheels	5,100,000	33,290,000
Total				468,540,000

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

Name of Reservoir.	Location.	Date of Completion	Height above City Datum.	Capacity in Gallons.
Fairmount—Reservoir No. 1	East Fairmount Park	1815	94 feet...	26,350,000
Fairmount—Reservoir No. 2		1821		
Fairmount—Reservoir No. 3		1827		
Fairmount—Reservoir No. 4, Section 1		1835		
Fairmount—Reservoir No. 4, Section 2		1836		
Fairmount—Reservoir No. 4, Section 3		1836		
Lehigh—Section 1	Sixth and Lehigh avenue	1852 and 1871	114 " ...	28,910,000
Lehigh—Section 2				
Lehigh—Section 3				
Spring Garden	Twenty-sixth and Master streets	1844	120 " ...	12,950,000
Corinthian	Corinthian avenue and Poplar street	1852	120 " ...	37,341,000
East Park—Section 1	East Fairmount Park	1887	133 " ...	62,738,000
East Park—Section 2		1888		306,400,000
East Park—Section 3		1889		319,480,000
Queen Lane—North Basin	Thirty-third street and Queen lane	1894	238 " ...	205,620,000
Queen Lane—South Basin				177,480,000
Frankford	Oxford Turnpike and Comly street	1877	167 " ...	36,046,000
Belmont	West Fairmount Park	1870	212 " ...	39,758,000
Mount Airy	Allen's lane and Mower street, Germantown	1851	363 " ...	4,546,000
Roxborough	Ridge and Shawmont avenues	1866	366 " ...	12,838,000
New Roxborough—North Basin	Port Royal avenue and Ann street	1893	414 " ...	71,594,000
New Roxborough—South Basin				75,438,000
Chestnut Hill Tank	Hartwell avenue and Chestnut Hill R. R., Chestnut Hill	1860	481 " ...	52,000
Belmont Stand Pipe	West Fairmount Park	1895	364 " ...	106,000
Roxborough Stand Pipe	Port Royal avenue and Ann street	1895	490 " ...	106,000
Frankford Stand Pipe	Oxford turnpike and Comly street	1930	300 " ...	106,000
Total				1,417,859,000

Statement of Pumpage for the years 1899, 1900 and 1901.

	1899. Gallons.	1900. Gallons.	1901. Gallons.
Pumped to reservoirs.....	107,991,371,604	106,822,576,055	103,805,457,224
Equal to gallons pum'd 100 ft. high.	231,813,686,728	218,119,532,621	210,456,847,513

Note.—The "pumped to reservoirs," etc., includes 1,968,833,130 gallons of re-pumpage to higher levels at Belmont, Roxborough, Mt. Airy, Chestnut Hill and Frankford High Service Stations, which, deducted from the total pumped, gives a total pumpage from rivers, of 101,826,624,094 gallons.

The quantity stored in reservoirs on December 31, 1901, was 354,416,599 gallons less than that stored on December 31, 1900. This quantity added to the total pumpage from rivers, makes the total consumption for 1901, 102,191,040,693 gallons. The cost of pumpage is based on the total pumpage. The consumption per capita is computed from the average consumption during 1901, of 279,975,453 gallons per day.

	1899. Gallons.	1900. Gallons.	1901. Gallons
Pumped by water power.....	8,618,634,347	5,726,488,277	7,138,554,754
Pumped by steam power.....	99,372,737,257	101,096,087,778	96,666,902,470
Largest quantity pumped in 24 hrs.	342,368,144	353,295,438	343,791,688
Smallest quantity pumped in 24 hrs	213,254,250	106,565,758	67,951,778

Year.	Average Daily Consumption.	Average consumption in gallons per capita per day, estimating the population at*	Cost of 1,000,000 gallons pumped 100 feet high.
	Gallons.	Gallons.	
1899	290,073,290	199.6	$2 90
1900	287,187,630	221.9	3 71
1901	279,975,453	211.9	4 14

*1899, 1,452,840 estimated. *1900, 1,293,697 U. S. Census.
*1901, 1,321,304 estimated.

The consumption during the year 1901 was 2,632,444,307 gallons less than during the previous year.

The cost of pumping one million gallons one hundred feet high, during 1901, was $4.14, or 43 cents in excess of that during the previous year. This increased cost of pumpage is due to increase of force and of cost of labor, to higher rates for coal and small stores and of all other materials incidental to the maintenance of the pumping stations.

About eight and one-half per cent. of the total pumpage was by water power, the turbine wheels using 241,156,642,620 gals. to pump 7,138,554,754 gals.

Statement of the Total Pipe Laid and of the Other Work Done during the Years 1899, 1900 and 1901.

Year.	PIPE LAID.			*PIPE RELAID.	FIRE HYDRANTS PLACED IN POSITION.			SUBSTITUTED FOR DEFECTIVE HYDRANTS.			Fire Hydrants in Use.	New Water Attachments.
	Feet.	EQUAL TO										
		Miles.	Feet.	Feet.	New Style.	Old Style.	Total.	New Style.	Old Style.	Total.		
1899	128,793	24	2,073	†86,727	711	.....	711	188	3	191	12,170	5,952
1900	196,178	37	818	‡82,282	450	.....	450	288	.....	288	12,620	5,148
1901	213,075	40	1,875	§20,794	380	.....	380	271	.....	271	13,000	5,144

Total Pipe Laid, 1,379.03 miles.

*Adds nothing to feet in ground.

†1899 Pipe taken up exceeds the quantity relaid 3,951 feet.

‡1900 Pipe taken up exceeds the quantity relaid 2,045 feet.

§1901 Pipe taken up is less than quantity relaid 1,289 feet.

Statement of Receipts and Expenditures for the Years 1899, 1900 and 1901.

	Receipts. 1899.	Receipts. 1900.	Receipts. 1901.
Receipts from water rents	$2,856,451 78	$2,967,497 39	$3,035,420 25
Receipts from fractional rent	54,075 44	55,954 52	76,481 65
Receipts from water pipes	80,644 23	98,465 15	91,618 07
Receipts fr'm City Solicitor's office	50,627 83	45,488 06	40,849 76
Receipts from penalties	40,229 09	38,234 59	35,102 42
Receipts from delinquent rent	31,787 30	32,426 60	38,643 00
Receipts f'm Chief Engineer's office	4,590 42	6,300 21	5,326 34
Receipts from searches	942 75	173 75	2,322 75
Receipts fr'm delinquent penalties	4,605 36	4,654 97	5,673 21
Total	$3,123,954 20	$3,249,195 24	$3,331,437 45
	Expenditures. 1899.	Expenditures. 1900.	Expenditures. 1901.
Current expenses	$1,461,583 36	$1,574,704 95	$1,524,201 00
For extensions	222,973 90	855,353 25	1,945,159 21
Total	$1,684,557 26	$2,430,058 20	$3,469,360 21

Bureau of Surveys.

The Chief Engineer of the Bureau of Surveys presents a comprehensive report upon the workings of this Bureau, dealing with the various public works under construction, and with the problems concerning projected improvements, which come directly under his supervision.

The expenditures during the past year were $1,650,-741.84. Of this amount $1,394,309.39 were expended for permanent improvements and the balance, $256,432.45, for the current expenses of the Bureau.

The receipts for the year were $145,001.96, being a decrease of $33,015.15 from the previous year.

Main Sewers.

In the annual appropriation for the year 1901, $300,000 were set aside for main sewers and was apportioned by ordinance of Councils approved March 27th, 1901; later in the year, $58,000 was transferred to this item and distributed.

A considerable amount of work which had been begun upon main sewers in 1900, was carried to completion in 1901.

Owing to the early distribution of the money by Councils, it was possible to place the work authorized for the year under contract very early, so that a large part of it was completed during the year. In all there were thirty contracts for main sewers.

The following main sewers begun in 1900 were completed during the year:

Charles Creek extension in Sixty-fifth street from Buist avenue to Woodland avenue.

Chestnut street, from Fifty-sixth to Fifty-ninth street.

Cohocksink sewer; reconstruction on Norris street, from Ninth street to a point east of Eleventh street.

Magee street, from Delaware river to Milnor street.

McKean street relief in Swanson street, from Snyder avenue to McKean street.

Connection with intercepting sewer in Ridge avenue, from Richmond Branch of Philadelphia and Reading Railway to Scott's lane, and on Scott's lane to Indian Queen lane.

Oxford street, from Thirtieth to Twenty-sixth street.

Robinson street, Race street, Sixty-second street and Market street, from terminus south of Vine street to Sixty-third and Market streets.

Wingohocking sewer, east branch, Twenty-first street, Godfrey and Stenton avenues, from stream south of Church lane to Cora street.

The following main sewers were commenced and completed during 1901:

Courtland street, from present terminus near Ninth street eastwardly.

Mantua creek, reconstruction in Thirty-seventh street, Mantua avenue to Brown street, and on Brown street, from Thirty-seventh to Thirty-eighth street.

Orthodox street, from Delaware river to Carbon street.

Sixty-second street extension, from north of Arch to Market street, and on Market street, from Sixty-second to Sixty-third street.

Thomas Run extension in Fifty-fifth street, from south of Baltimore avenue to near Thomas avenue.

Main sewers commenced prior to or during the year 1901, upon which work is still in progress:

Aramingo avenue, from Norris street to Delaware river.

Cohocksink reconstruction in Norris street, from a point east of Eleventh street; on Eleventh street, from Norris to Diamond street; on Diamond street, from Eleventh to Twelfth street.

Cohocksink sewer relief in Shackamaxon street, from Delaware river to Thompson street.

Cohocksink sewer relief on Mascher street, from Girard avenue to Thompson street.

Lincoln avenue extension, Sedgwick street to Cresheim avenue and on Cresheim avenue to Mt. Pleasant avenue.

McKean street relief sewer on McKean street, from Swanson street westwardly.

Montgomery street relief in Sydenham street, on Columbia avenue, Sydenham street to Twentieth street.

Pratt street, from Willow to Charles street.

Rosehill street, from Allegheny avenue to Connecting Railway.

Shunk street sewer system on Weccacoe avenue, from Oregon to Shunk street, and on Shunk street westwardly.

Thomas Run sewer system in Conestoga street, from South to Pine street.

Thomas Run sewer in Frazier street, from Whitby avenue to Willows avenue, and on Willows avenue to Fifty-seventh street, on Fifty-seventh street to Florence avenue.

West branch Wingohocking sewer on Belfield avenue and Sprague street, from Sharpnack street to Mt. Pleasant avenue.

Wingohocking sewer, east branch, on Stenton avenue and Anderson street, from Cora street northwesterly.

York street, from Aramingo avenue to Tulip street.

Important main sewers recommended to be built:

Extension of the Wissahickon High Level Intercepting Sewer south of Rittenhouse street.

Extension of the Wissahickon High Level Intercepting Sewer north from Rex avenue to Chestnut Hill avenue.
Extension of the Main Intercepting Sewer, from the American Pulp Works to Shawmont avenue, and on Shawmont avenue to the Roxborough Filter Beds.
Wingohocking creek, east branch, northwest from Fisher's lane.
Frankford Intercepting System.
Shunk street, west of present terminus.
McKean street relief, west of Second street.
Cohocksink Relief Sewer, continuation of the work upon Shackamaxon street and on Germantown avenue.
Extension of the sewer from Sixty-third and Market streets to Cobb's creek.
Extension of Thomas Run sewer to Cobb's creek.
Extension of Pratt street sewer.
Branch of Thomas Run on Florence avenue.
Sixtieth and Trinity streets to Fifty-ninth street and Chester avenue.
Extension of Thomas Run sewer to Fifty-sixth, and at Fifty-third and Locust streets.
Extension of Orthodox street sewer to Richmond street.
Extension of George's Run sewer to City line.
Dobson's Run sewer extension.
Rock Run sewer on Ashdale street, west of Philadelphia and Newtown Railroad.
Indiana avenue, between Ormes and Fifteenth street.
Jackson street, between Schuylkill river and Thirtieth street.

The sewers above recommended are required for the development of the city in order to provide proper sanitary facilities and to keep pace with the improvements in real estate.

For the coming year 1902, Councils have appropriated the sum of $200,000 for main sewers in general, and the sum of $100,000 for the continuation of the work of building a relief sewer to the Cohocksink sewer, and $50,000 for continuing the McKean street sewer. While this sum will be sufficient to provide the necessary relief for a number of localities, it will still leave many other places unprovided for.

Councils have authorized the creation of a loan in which

it is intended to devote the sum of $1,000,000 for construction of sewers. If the people at the coming election act favorably upon the creation of this loan, the sum set apart for sewers will go far toward relieving the immediate needs for drainage.

The building of connections with the Intercepting Sewer in various streets is being continued each year, resulting in a more complete removal of objectionable material from the water supply of the City. The total length of connections to the Intercepting Sewer built during the year was 12,235 feet, at an approximate cost of $76,027.11.

The following work in connection with the Intercepting System was completed during the year:

Conarroe street, from Main to Cresson street.
Hermitage street, from Smick to Silverwood street.
Leverington avenue, from Ridge avenue to Shalkop street.
Mansion street, from Hermitage to Gates street; on Gates street, from Mansion street about 170 feet northeast.
Midvale avenue, from Wissahickon avenue to Coulter street.
Pechin street, from Roxborough avenue to Martin street.
Ridge avenue, from Philadelphia & Reading Railway Bridge to Scott's lane, and on Scott's lane, from Ridge avenue to Indian Queen lane.
Rector street, from Terrace street to 210 feet northeast of Pechin street.
Rector street, from Manayunk canal to 210 feet northeast.
Schuyler street, through grounds of the Blabon Oilcloth Works and the Midvale Steel Works to a point near Roberts avenue.
Sharpnack street, from Jefferson street to Germantown avenue, and on Berdan street, from Sharpnack to Sharpnack street.

The following work in connection with the Intercepting system was commenced prior to or during 1901, and is still in progress:

Schuyler street, from Roberts avenue to a point about 150 feet southeastward, and on Roberts avenue, from Schuyler to King street.
Wayne avenue, from the Pennsylvania Railroad Bridge to a point about 100 feet north of Lincoln avenue.

Wissahickon avenue, from Roberts avenue to Deacon street, and on Deacon street, from Wissahickon avenue to King street.
Lincoln avenue, from Sedgwick street to Cresheim avenue, and on Cresheim avenue to Mt. Pleasant avenue.

The Main Intercepting Sewer at present intercepts sewage from the territory comprising Manayunk, Roxborough, Falls of Schuylkill, portions of Germantown, Chestnut Hill and part of the Thirty-eighth Ward. As originally designed, it was not intended to perform this duty.

The relief sewer which was designed at that time and intended to carry the drainage of Germantown and Chestnut Hill on a high level from the water shed of the Wissahickon to the water shed of the Delaware, should be constructed as early as practicable. This work is of considerable magnitude, and a liberal appropriation should be made for this purpose.

The extension of the Main Intercepting Sewer from the American Pulp Works to Shawmont avenue, and on Shawmont avenue to the new filter plants at Roxborough, is imperative owing to the necessity of carrying off the waste from the sand washings and also to provide an outlet for the drainage at Upper Roxborough. An appropriation should be made at once for this purpose.

Two hundred and ninety-five (295) drain connections were made to the Manayunk Intercepting Sewer and its branches; 5,770 other connections were made to various sewers during the year. These do not include about 1,575 buildings connected to sewers which were built at private cost.

On the Wingohocking System, work which had been placed under contract, was continued on the west branch, northwest of Sharpnack street; on the east branch northwest of the intersection of Stenton avenue and Cora street, and also in the work of extending the outlet on Courtland street eastward from Ninth street. It is recommended

that the east branch be continued beyond Chelten avenue to allow for a real estate development in this section, and that a portion at the lower end of this branch, northwest from Eighteenth street and Fisher's lane be constructed. Under the existing contract, the west branch will be completed to Mt. Pleasant avenue, from which point tributary branch sewers may be built.

The necessity for early action upon the needs of the Frankford Intercepting System is apparent from the fact that Little Tacony Creek is receiving an increased discharge of sewage each year, which is becoming more objectionable to the residents of Frankford. These conditions should be relieved, and it can only be done by making liberal appropriations to inaugurate the work.

In the lower section of the city, between the Delaware and Schuylkill Rivers, where the ground is very low, and in some cases below the elevation of high tide, in order that it may be developed and improved, the extension of large main sewers from the Delaware River to Broad street, is imperative. This work has been begun in the case of the Oregon avenue sewer, which is now built on Oregon avenue and Weccacoe avenue, and on Shunk street west of Weccacoe avenue, and in the case of the McKean street sewer which has been built upon Swanson street and on McKean street to a point west of Second street. It is desirable that sufficient funds be provided to extend both of these sewers to their ultimate terminus at Broad street. The McKean street relief sewer is needed especially to remedy the conditions which exist at the intersection of Thirteenth and Morris streets at the time of very heavy rain fall.

Work upon the extension of the outlet of the Aramingo Canal Sewer, from Norris street to Delaware River, has been carried on through the year and has, for the most part, been completed, with the exception of the construc-

tion of the concrete bulkhead across the end of Aramingo Canal. This work being all below low water is very tedious and has been much delayed by excessive rains during the past season. The work under the existing contract will practically complete the outlet portion of the system.

A large relief sewer has been under construction in York street, between Aramingo avenue and Emerald street; this is needed to remedy the overflows which occur at the intersection of Frankford road and Amber street. It will require additional funds to provide a complete improvement, and it is recommended that an appropriation be made to do the work.

The work of reconstructing portions of the Cohocksink Sewer on Diamond street, between Eleventh and Twelfth streets, and on Twelfth street northward, is in progress. The contract made in 1900 for the sum of $56,000 was continued, being supplemented by additional appropriations, making the total amount of work done under this contract $118,000.

A serious break occurred in the Cohocksink sewer at Fifth and Thompson streets, and as it was impracticable to repair the old sewer, the broken and weakened portions were reconstructed, the work being done by the Bureau of Highways under its contract for furnishing labor in emergency cases and under the supervision of the Bureau of Surveys.

The work upon the relief to the Cohocksink sewer in Shackamaxon street, from Delaware river to Thompson street, and on Thompson street westward, which was placed under contract in 1900, was continued. The difficulties encountered in the matter of foundations when this work was commenced, prevented rapid progress, but the condition having improved the work is now progressing very favorably. The urgency of this Cohocksink relief sewer has resulted in Councils making an additional appropria-

tion of $100,000 for the coming year. It is urgently recommended, however, that sufficient funds be provided to carry the relief sewer to its ultimate terminus at the intersection of Ninth and Berks streets.

The Chief Engineer in his report gives a list of other main sewers which are especially urgent, in view of the extensive improvements in the development of property and for improving the sanitary conditions of the City.

I approve of his recommendation and would urge an appropriation sufficient to meet all the requirements for the development of the City. Attention is called to the fact that by reason of the construction of so many tall buildings with basements, cellars and sub-cellars, in the central part of the City, and the improvements in the character of the street and footway paving in recent years, deeper sewers will be required and of greater size, which will obviate the necessity of pumping from all these large buildings into the City sewers.

Branch Sewers.

During the year 192 contracts were executed for branch sewers, of which 187 were completed. 22.987 miles of branch sewers were constructed by the City and under private contract 3.311 miles. There were 8 contracts for the construction and reconstruction of inlets, involving the expenditure of $60,000. Under these contracts there were constructed or reconstructed 491 inlets, not included in sewer contracts. There was placed 5,616.66 feet of curved and straight granite curbing and 27,780 linear feet of lateral sewer connections in streets to be paved or repaved.

Rainfall, Discharge and Tidal Observations

For several years past the Bureau of Surveys has been installing instruments for the observation of the rise and fall of the flow of water in sewers, and comparison has been

made with the amount of rainfall as indicated by pluviometers installed in the various district offices. In addition, by careful observations with proper instruments, velocities of the flow of water in the sewers at various depths have been tabulated. A careful record of the high and low tides occurring in the Delaware river is also kept. All of these observations bear directly upon the design of sewers and the action of sewers in service. The changes in the conditions of recent years, since impermeable pavement has been introduced, requires a careful record to be kept of these experiments, in order to provide proper designs for the carrying off of the water which falls upon these pavements during heavy rainfalls.

Testing Laboratory.

The scope of the work at the Testing Laboratory was greatly increased during the year, owing to the appropriation made by Councils of the sum of $5,000 for more complete equipments. With this sum there was purchased a large machine of 300,000 pounds capacity for making tensile, compressive and transverse tests on all kinds of materials; an improved cement testing machine and turning lathe for preparing specimens, improvements to the brick testing machinery and a variety of small apparatus required in scientific tests of materials. The construction of the filters in connection with the Improvement, Extension and Filtration of the Water Supply, has placed upon this laboratory a greater amount of work than heretofore. The report in detail of the Chief Engineer will show that during the past year there has been a large increase in the number of shipments of cement tested and also in the number of samples of brick, sand, concrete and clay, which tests have been carefully analyzed and from the results obtained, the Department was better enabled to form a correct judgment as to the acceptance or rejection of the materials submit-

ted. Studies are also being made as to the effect of different materials upon cement when mixed with it, and other investigations are being carried out on original lines, with a view to improving the character of the public work, and the quality of materials entering into it.

Bridges.

At the beginning of the year there was available for the construction of bridges the sum of $780,615.37. Ordinance of Councils approved December 12, 1900, authorized the construction of certain bridges, eighteen in number. Drawings were prepared, contracts entered into and work was commenced at the following locations:

Bridges to carry Thirty-third street over the Connecting Railway and the Philadelphia and Reading Railway.

Bridges over Frankford creek, on lines of Frankford avenue and Old Front street.

Allegheny avenue, under North Penn Railroad.

Luzerne street, under North Penn Railroad, to abolish grade crossing at Rising Sun lane.

Lehigh avenue, under Connecting Railway, including the construction of sewers in Eighteenth street and Lehigh avenue.

Gibson avenue, over Baltimore and Philadelphia Railroad.

Fifty-seventh street, over West Chester & Philadelphia Railroad.

Seventy-first street, over Philadelphia, Wilmington & Baltimore Railroad.

Oak lane, over North Penn Railroad.

High street, Chew street and Washington lane bridges, under Chestnut Hill Branch, Philadelphia and Reading Railway, including the necessary work of abolishing grade crossings at these streets.

Dauphin street, under Connecting Railway.

Olney avenue, under Tabor Branch, Philadelphia & Reading Railway, and under North Penn Railroad.

Fifty-second street, over West Chester & Philadelphia Railroad.

Considerable preliminary work has also been done upon the proposed bridge on the line of Passyunk avenue over the Schuylkill river; the plans for this bridge have been submitted to the Secretary of War and his approval received.

The bridge on the line of Coulter street over the Philadelphia, Germantown and Chestnut Hill Railroad, contracted for in 1900, was completed in June, 1901.

The Grays Ferry bridge, the construction of which has been in progress for a number of years, was fully completed and transferred to the Bureau of Highways on December 10, 1901.

Of the work placed under contract during the year, only the bridges on the line of Seventy-first street and Fifty-seventh street were completed. Upon the balance of those under contract considerable progress has been made; in some cases the abutments have been completed and in others the steel work is being placed in position, so that nearly all those now under contract will be completed in the early part of the current year.

The construction of these bridges will open up new means of communication between improved sections across railways and streams, and will add greatly to the convenience of the public and hasten the development of adjacent sections. By reason of the development of real estate in certain sections of the City, there is an increase in demand for the construction of bridges.

The Chief Engineer in his report has recommended the construction of a number of bridges. The following are the most urgent:

Thirty-third street, over Philadelphia & Reading Railway and Connecting Railway (to complete).

Fifty-second street, over West Chester & Philadelphia Railroad (to complete).

Hunting Park avenue, over Richmond Branch, Philadelphia & Reading Railway.

Seventeenth street, over Philadelphia, Germantown and Norristown Railroad.

Large street, under Frankford Branch Philadelphia & Reading Railway.

Erie avenue, under Richmond Branch Philadelphia & Reading Railway.

Gravers lane, over Chestnut Hill Branch Philadelphia & Reading Railway.

Passyunk avenue, over Schuylkill river.
Allegheny avenue, under Connecting Railway.
Walnut lane, over Wissahickon creek.
Sedgley avenue, over Richmond Branch Philadelphia & Reading Railway.
Stokley street, over Richmond Branch Philadelphia & Reading Railway.
Glenwood avenue, over Richmond Branch Philadelphia & Reading Railway.
Wyoming avenue, over Frankford creek.
Armat street, under Chestnut Hill & Germantown Branch Philadelphia and Reading Railway.
Montgomery avenue, over Connecting Railway.
Fifty-eighth street, over West Chester & Philadelphia Railroad.
Front street, over Connecting Railroad.
Sixty-fifth street, over Baltimore & Philadelphia Railroad.
"D" street, over Connecting Railway.
Sixtieth street, over Philadelphia, Wilmington & Baltimore Railroad.
Centre street, under Philadelphia, Germantown & Norristown Railroad.
Twelfth street, under Connecting Railway.
Woodbine avenue, north of Haverford avenue.
Upper deck of Falls bridge.
School lane, over Philadelphia, Germantown & Norristown Railroad.
Collum street, under Germantown & Chestnut Hill Railroad.
Belfield avenue, under Philadelphia & Reading Railway.

Pennsylvania Avenue Subway and Tunnel.

The Subway and Tunnel on Pennsylvania avenue were completed and placed in service in 1900. One small contract was entered into during 1901 and settlement was reached upon two other contracts where litigation had been pending. The total amount of the Subway Loan, which had been negotiated is $5,425,000, the balance on hand unexpended on Decemer 31st was $15,636.58.

After nearly two years of service the value to the public and the railroad company of this great improvement, is becoming more apparent. By the removal of the many dangerous grade crossings, the numerous fatalities which

occurred along the line of the railroad have been done away with and the railroad company has been benefited by the better facilities provided for handling its traffic and by the increased speed with which it is enabled to run its trans.

The following is a statement of the amount expended on this work, the amount paid by mandamus and the balance on hand, etc.:

Total amount paid for contracts	$4,067,482 15
Paid by mandamus for land and damages	1,040,345 71
Expert fees in damage cases	29,185 05
Road jury fees in damage cases	3,826 00
Labor, Water, Electrical and Gas Bureaus	41,102 00
Engineering inspection and incidentals	227,422 51
Balance on hand December 31, 1901	15,636 58
	$5,425,000 00

Dredging Delaware and Schuylkill Rivers.

Owing to an agitation by the trade organizations, Councils, by Ordinance, appropriated the sum of $250,000 to continue the work of improving the channels of the Delaware and Schuylkill rivers. Plans were prepared and the work placed under contract late in the fall.

The specifications require that all dredged material shall be placed over the banks, within the limits of League Island Park, thus, in addition to the improvement of the rivers, this work will hasten the completion of the improvement of this park. A great deal of preliminary work has been done in the way of constructing banks, sluices, a canal and receiving basin, and about 7,000 cubic yards of mud and sand were removed from the channel of the Delaware river during the last week of the year.

Widening Delaware Avenue.

Owing to the fact that additions were being made to the gas and water service, the placing of new mains for

the high pressure fire service and the laying of electrical conduits by the Girard Estate, upon Delaware avenue, between Vine and South streets, the permanent pavement was not laid.

It is expected that the various railroad interests will lay rails during the coming year and enable the permanent pavement to be completed.

In the matter of pier extension, a contract was entered into and completed, for placing an enclosing building upon the deck of the Race street pier, Delaware river, with a pavilion upon the upper deck.

One of the features of this pier is the provision made for the river and harbor police and fire service, providing roll rooms, sleeping rooms and conveniences on the lower deck, for their occupancy. Two towers at the outer end of the pier, one for use of the harbor firemen for drying hose, and the other as an observation tower for the public, add very much to the attractiveness of the pier.

The total expenditure to date on account of the widening of Delaware avenue and extension of City piers, including the sums paid for acquiring additional property on the river front, in settlement of land damages, amounts to $1,960,841.40.

Negotiations are being carried on with owners of property on Delaware avenue, between Vine and Green streets, which would be affected by the proposed widening, with a view to the adjustment of damages, prior to the actual work of widening.

District Surveyors.

The Board of Surveyors, composed of the Surveyors and Regulators from the different districts in which the City is divided, with the Chief Engineer as its President, held twenty-three stated meetings for the transaction of general business and six special meetings required for the

purpose of visiting localities where revisions of City plans were being made.

One hundred and thirty-three (133) plans were submitted for the action of the Board, 111 being finally confirmed and two rejected. Thirty-seven (37) of the plans submitted by the passenger railway companies for extension and improvements and alterations were considered and approved. Four hundred and twenty-nine (429) ordinances and petitions for the construction of sewers, placing of new streets upon the City plan, striking from the City plan and vacating other streets, revision of territory, changes of street names, etc., referred to the Board by Councils were acted upon and 136 deeds of dedication were approved.

The cash receipts and work performed by the District Surveyors for the City during the year, amounted to $230,250.65, an increase of $23,758.41 over the previous year, exceeding the expenditures of the 13 districts by $62,225.84. On the 30th of December, Councils created an additional Survey District, to be numbered the Fourteenth, comprising that portion of the Tenth Survey District, covering portions of the Thirty-fifth and Forty-first Wards, northeast of Cottman street or Township line.

The following is a summary of the receipts and expenditures of the District Surveyors for the year 1901, and in totals for the years 1899 and 1900:

Summary of Receipts and Expenses of District Surveyors.

	Surveyors.	Cash Receipts.	Credit for Work done for the City.	Total Credit.	Expenses.				Balance Profit to the City.	Profit to the City in 1900.	Increase.	Decrease.
					Salaries.	Pay of Assistants.	Miscellaneous.	Total.				
1	{Thos. Daly..... / Jno. M. Nobre....}	$6,918 47	$6,505 40	$13,423 87	*$2,283 33	$6,298 65	$2,300 86	$10,882 84	$2,541 03	$2,076 38	$464 65	
2	Charles W. Close.....	4,465 60	6,284 03	10,749 63	3,000 00	5,470 00	1,527 85	9,997 85	751 78	505 58	246 20	
3	Wm. C. Cranmer.....	6,651 23	7,806 54	14,457 77	3,000 00	6,779 96	1,717 23	11,497 19	2,960 58	5,065 25	.....	$2,104 67
4	Frits Bloch	4,196 01	7,806 81	12,002 82	3,000 00	5,580 00	1,419 24	9,999 24	2,003 58	3,171 42	.....	1,167 84
5	Walter Brinton.....	13,423 52	10,799 77	24,223 29	3,000 00	7,913 48	2,086 23	12,999 71	11,223 58	7,259 26	3,964 32	
6	Joseph Mercer.....	12,503 86	13,157 00	25,660 86	3,000 00	8,874 97	2,325 03	14,200 00	11,460 86	11,215 57	245 29	
7	Wm. K. Carlile.....	4,246 76	5,914 41	10,161 17	3,000 00	4,423 29	1,476 24	8,899 53	1,261 64	1,033 06	228 58	
8	C. A. Sundstrom.....	2,930 46	12,587 23	15,517 69	3,000 00	9,407 93	2,691 62	15,099 55	418 14	1,113 49	.....	695 35
9	Jos. C. Wagner.....	8,657 04	8,849 15	17,506 19	3,000 00	10,700 40	1,799 60	15,500 00	2,006 19	712 20	1,293 99	
10	Jno. H. Webster, Jr.	10,084 43	13,727 59	23,812 02	3,000 00	8,493 95	2,406 05	13,900 00	9,912 02	4,375 26	5,536 76	
11	Joseph Johnson.....	12,613 06	14,120 78	26,733 84	3,000 00	10,788 00	2,344 23	16,132 23	10,601 61	2,323 01	8,278 60	
12	J. H. Gillingham	10,441 09	10,473 38	20,914 47	3,000 00	8,082 41	4,034 26	15,116 67	5,797 80	9,168 50	.....	3,370 70
13	H. M. Fuller	8,149 00	6,938 03	15,087 03	3,000 00	8,892 67	1,907 33	13,800 00	1,287 03	116 43	1,170 60	
	Total 1901.....	$105,280 53	$124,970 12	$230,250 65	$38,283 33	$101,705 71	$28,035 77	$168,024 81	$62,225 84	$48,135 41	$21,428 99	$7,338 56
	Total 1900.....	$106,207 91	$100,284 33	$206,492 24	$39,000 00	$95,225 41	$24,131 42	$158,356 83	$48,135 41	$85,251 62	$4,843 04	$41,861 93
	Total 1899.....	$106,973 51	$138,305 68	$245,279 19	$39,000 00	$95,960 67	$25,164 22	$160,124 89	$85,251 62	$51,143 22	$42,890 59	$8,704 40

* Of this sum $291.67 was paid to Thos. Daly, removed Feb. 2, 1901, and the balance, $1,991.66, to Jno. M. Nobre, appointed May 2, 1901.

Registry Division.

Worn out registry plan books are being renewed each year, although the appropriation has been insufficient to keep pace with the gradual deterioration of these books, due to the large amount of handling by the public.

The following is a comparative summary of operations of the Registry Division of the Bureau of Surveys during the years 1899, 1900 and 1091:

	1899.	1900.	1901.
Number of certificates of registered owners issued.	4,194	3,264	3,765
Number issued for use of Law Department.....	1,010	1,235	1,031
Receipts from certificates of registered owners..	$1,058 50	$816 00	$903 25
Receipts from miscellaneous sources.....	$115 68	$119 85	$133 85
Number of original lots plotted.....	12,030	8,409	8,842
Number of transfers registered.....	29,176	30,055	29,714
Number of plans made for use of City Departments, Bureaus, etc.....	294	415	481
Number of examination of registry plan books made by the public.....	39,981	48,996	50,808
Number of descriptions of property filed for registry	41,206	38,464	38,556
Number of titles perfected.....	2,345	2,407	2,361
Number of certificates of legal opening of streets issued to bureaus, etc.....	2,534	1,308	1,876
Number of certificates of registered owners in municipal lien cases for Law Department....	1,713	1,849	1,230

There is a marked decrease in the number of searches issued by this division of the Bureau since the year 1897, and while the number of searches issued during the year 1901 shows a slight increase over the number issued in 1900, it indicates that the return to the number issued in 1897 is not probable.

In 1897, 12,700 were issued, in 1901, only 3,765, showing a decrease of 8,935.

In view of the handling of these books by the general

public and the continual use by the title companies, I would renew my recommendation that legislation be enacted to fix a reasonable charge for each examination, which would aid in making the division self-supporting and pay for keeping the books in proper repair.

The following tables give a comparative summary of the operations of the Bureau, actual construction work, receipts and expenditures during the years 1899, 1900 and 1901:

Summary of Main, Branch and Private Sewers and Bridges Built during the years 1899, 1900 and 1901.

	1899.		1900.		1901.	
	No.	Linear feet.	No.	Linear feet.	No.	Linear feet.
Bridges	1	.....	4	.....	21	
Subway bridges	7	.....				
Intercepting sewer connections	3	4,372.20	5	2,847.00	2	4,377.00
Main sewers	12	10,085.60	31	23,779.52	28	17,552.37
Branch sewers	209	176,013.31	191	186,237.68	187	121,373.24
Private sewers	69	29,665.00	48	20,324.00	46	17,480.00
Subway sewers	3	2,363.00				
Delaware avenue sewers	6	888.80				
Total	310	*223,392.91	279	†233,188.20	284	‡160,782.61

*Equal to 42.31 miles. †Equal to 44.16 miles. ‡Equal to 30.45 miles.

Statement of Work upon Bridges during the years 1899, 1900 and 1901.

	1899.	1900.	1901.
Finished	1	2	4
Begun	1	1	17
Authorized	.....	14	1
Planned	28	24	15

Statement of Receipts.

Year.	Receipts of Bureau.	Receipts of District Surveyors.	Total.	Increase.	Decrease.
1899.....	$41,839 72	$106,973 51	$148,813 23		
1900.....	71,809 20	106,207 91	178,017 11	$29,203 88	
1901.....	39,721 43	105,280 53	145,001 96	....	$33,015 15

Statement of Expenditures.

	1899.	1900.	1901.
Current expenses.....	$246,506 41	$245,122 78	$256,432 45
For extensions.....	2,070,742 01	1,891,634 32	1,394,309 39
Totals.....	$2,317,248 42	$2,136,757 10	$1,650,741 84

Bureau of Highways.

The great extent and variety of work done by this Bureau during the past year, is shown in detail in the tables found in another portion of this report.

The paving and repaving of streets with improved pavement, the grading and opening of streets, resurfacing of streets with sheet asphaltum, macadamizing of roads, repairs to bridges, repairs to paved streets, etc., have been continued to the full extent of the funds available and the work prosecuted with the same energetic activity that characterized it in the previous year.

The expenditures of the Bureau of Highways during the past year were $2,623,213.20, the receipts being $146,474.13, an increase in receipts over the previous year of $10,418.40.

The figures relative to the various repairs and maintenance of our highways are very instructive and give gratifying evidence of active work, resulting in much needed improvements.

The following table shows the classification of street pavements laid during the year and their mileage; also the total mileage of the various kinds of street pavements on December 31st, 1901:

General Pavement Statistics.

Kinds of Pavements	Laid During 1901		Making Total in City, Dec. 31, 1901,	
	Sq. Yds.	Miles.	Sq. Yds.	Miles.
Sheet asphalt	481,707	32.55	4,656,333	301.97
Asphalt block	.....	.....	180,702	19.30
Granite block	74,870	2.88	5,987,442	360.26
Cobble or rubble	.....	.....	1,495,271	61.64
Vitrified brick	82,837	6.97	2,138,659	134.81
Graholithic	.....	.....	72,726	12.77
Slag block	.....	.....	71,280	9.83
Macadam	171,292	18.19	2,348,478	226.12
Total	810,706	60.59	16,950,891	1,126 69

In addition to the paved and macadam streets, there are 413.31 miles of unpaved streets or dirt roads.

The paving and repaving with improved pavements, amounted to 308,742 linear feet, a distance of more than 58 miles. The total work of this character during the past three years was 192.56 miles, an increase of more than 20 per cent.

An earnest effort has been made to improve the quality of the material used in street paving and the character of the work with good results. The change in the condition of the City's highways is as gratifying as it is extensive and Philadelphia may proudly claim the distinction of being the best paved city in the country.

The businesss of this Bureau was covered by 558 contracts, classified as follows: 186 for new paving; 158 for

repaving; 85 for grading and 129 of a miscellaneous character.

In addition to the large amount of work, by reason of the liberal appropriations for maintenance and new work in 1901, the operations of private corporations in building structures of all sorts under and upon our highways, have added to the labors and anxieties of the officers of this Bureau.

During the year, contracts were awarded for the grading of streets authorized by Councils, to the full extent of the appropriation. The work done amounted to 1,029,731 cubic yards. Councils have authorized the grading of streets at an estimated cost of $260,000. Proposals for most of this work have been received but it could not be placed under contract owing to the insufficient appropriation; to the extent of the funds available it will be contracted for out of the appropriation for 1902.

An Ordinance of Councils requires that when streets are repaved, the old square curbs at the intersections shall be removed and curved curbs placed in lieu thereof. The appropriation for this work during the past year was $10,000, an amount entirely inadequate to meet the requirements of the Department. After exhausting this appropriation, we were compelled to have the balance of the curved curbs required, placed by the contractor for repaving, thus diminishing the latter class of work about 10,000 square yards.

Much has been said in previous reports of the neglect of owners of property to place suitable curbing in front of their properties abutting on streets authorized to be paved or repaved. This neglect continues and the appearance of streets newly paved or repaved, is very much marred by the unsightly curbs. I therefore renew my recommendation of previous years, that Councils pass an ordinance making it obligatory to place dressed granite curbs on all streets prior to paving or repaving.

Eighteen and nineteen one hundredths (18.19) miles of roads in the suburban sections were macadamized during the past year. Of the 207.93 miles of macadamized highways which the City maintained, the portions requiring it were repaired in a substantial manner; 37,484 tons of broken stone were spread and rolled, covering an area of over 35 miles. At the close of the year all macadamized roads, as a whole, are in most excellent condition.

The sprinkling of macadam roads was commenced on April 12, 1901, and continued without interruption until November 12. The advantages derived from sprinkling macadam roads has been fully demonstrated by the prolonged life of the roadbed and economy in maintenance.

Owing to the heavy rainfalls during the year, several bad breaks occurred in the sewers, which were expeditiously and properly repaired. Systematic and stated inspections of sewers were made; many small breaks were discovered and promptly repaired, preventing more serious damage.

The repairs to all classes of street pavements, except asphalt and granolithic, were made under annual contract for the sum of $172,900. The contractors commenced work in the early spring and placed all streets in first class repair, maintaining them in good condition throughout the year. Repairs to streets paved with asphalt and granolithic were made at a price per square yard.

The constant displacement of the street surface by private corporations is largely the cause of the unsatisfactory condition of the paving on many of the streets of the city. For the laying of conduits, the Keystone Telephone Company opened 57.5 miles of streets and the Bell Telephone Company, for the same purpose, 11.32 miles. The United Gas Improvement Company opened 32.7 miles for the laying of new gas mains and in addition, made 53,000 openings for the purpose of making house connections, repairing leaks, etc.

Privileges for the opening of streets in order to place underground structures are constantly being asked for and if granted, will continue indefinitely the tearing up of street pavements and the interference with the transaction of business by the general public.

In the early part of the year, a thorough inspection was made of the condition of all streets paved with asphalt. Many which had been paved years ago, and on which the time limit for maintenance had long since expired, were found to be in such poor condition, that it was useless to attempt patching them; in all such instances, the streets were resurfaced from curb to curb under the contract for this character of work, at $2.05 per square yard, with a ten year guarantee for their maintenance. 133,281 square yards, a distance of 27,700 linear feet were resurfaced during the year.

Repairs to the City's bridges were made to the full extent of the amount appropriated for the purpose and are set forth in detail in the report of the Superintendent of Bridges.

The amount appropriated during the year for the maintenance of bridges was $65,000, which was utterly inadequate to provide for all repairs absolutely necessary to be made to these valuable structures. The Bureau of Highways has under its care 311 bridges, the estimated value of which is $18,000,000. The Department cannot keep these structures in proper repair with the money provided and it is poor economy to permit such valuable properties to deteriorate by reason of neglect in making repairs.

The estimated cost for making the necessary repairs and painting the City's bridges to place them in proper condition is $203,800. The appropriation made for this class of work for the year 1902, is but $15,000.

Very much has been said in the public prints and otherwise, about the alleged exorbitant price which the City

now pays for its work. An examination of the records of the Department develops the fact that during the past three years the City has paid less per square yard for street paving than was paid in previous years, notwithstanding the fact that material and labor are now more costly and that the work was required to be done under more stringent specifications.

During the past three years the highest price paid for asphalt pavement on a six inch concrete foundation, was $2.62 per square yard and on an eight inch concrete foundation, $2.82. Prior to the year 1899, it cost the City for the same character of pavement and with the same guarantee, $2.75 per square yard on a six inch concrete foundation, and $3.15 on an eight inch concrete foundation.

In previous years, vitrified brick pavements cost the City $2.20 per square yard on four inch concrete foundation, while during the past three years, the average price paid for this class of pavement on a six inch concrete foundation was $2.05 per square yard.

Granite block paving laid under similar conditions, cost, in past years, $3.85 per square yard and during the years 1899, 1900 and 1901, the highest price paid was $2.63 per square yard.

Truly these figures speak for themselves and I submit them in evidence of the statement made in the beginning of this report, that we are administering the affairs of this Department for the best interests of the taxpayers and to secure for them the largest return possible for the money expended.

The following tables give comparative statements in detail of the work done during the years 1899, 1900 and 1901, and of the receipts and expenditures of the Bureau of Highways:

Comparative Statement of Work Done.

	1899.	1900.	1901.	
New paving	306,144	282,620	212,689	linear feet.
Macadamizing (new)	43,442	75,782	96,053	linear feet.
Grading	1,451,379	1,006,173	1,029,731	cubic yards.
New footway paving	111,861	122,885	117,746	square yds.
Repairs to paved streets	1,901,934	1,008,152	556,787	square yds.
Footways repaved	30,749	34,280	38,104	square yds.
Ditches repaved	83,992	76,670	64,802	square yds.
Gutter stone laid	65,042	42,119	24,148	linear feet.
Crossing stone laid	19,158	38,115	13,998	linear feet.
Tramway stone laid	2,106	.....	.....	linear feet.
Curb stone reset	386,164	350,329	242,239	linear feet.
Wooden trunks	6,647	4,987	7,312	linear feet.
Brick and stone drains	2,950	992	566	linear feet.
Hand railings	3,666	2,675	7,267	linear feet.
Broken stone used	50,000	60,000	37,484	tons.
Macadamizing (resurfacing)	179,697	245,422	186,4 9	linear feet.
Curved curb corners	37,066	30,434	16,031	linear feet.
New curb stone set	.....	150,983	134,581	linear feet.
Vitrified brick and stone gutters	.....	27,567	19,227	linear feet.
Resurfacing sheet asphalt	.....	127,885	133,281	square yds.
Footway, curb and railroad notices served	57,964	70,911	55,524	

Summary of Work Done in Improved Pavements—New Streets.

	1899.		1900.		1901.	
	Sq. Yds.	Linear Ft.	Sq. Yds.	Linear Ft.	Sq. Yds.	Linear Ft.
Granite blocks.	7,715	3,052	21,901	5,000	8,666	2,740
Sheet asphalt...	37,260	11,035	171,157	49,022	197,676	60,332
Vitrified bricks.	142,107	47,375	59,150	21,005	69,324	31,314
Asphalt blocks.	2,702	685				
Macadamizing.	75,408	43,442	155,004	75,782	171,292	96,053
Total	265,192	*105,589	407,212	†150,809	446,958	‡190,439

Replacing Cobblestone With Improved Pavements—Old Streets.

	1899.		1900.		1901.	
	Sq. Yds.	Linear Ft.	Sq. Yds.	Linear Ft.	Sq. Yds.	Linear Ft.
Granite blocks.	7,106	2,428	115,341	28,503	29,255	6,575
Sheet asphalt...	551,121	221,695	290,186	133,683	272,374	106,249
Vitrified bricks.	17,735	6,384	59,707	22,925	13,513	5,479
Slag block.....	22,985	13,490	30,413	22,482		
Total	602,947	*243,997	495,647	†207,593	315,142	‡118,303

*1899.—Total amount of new paving 349,586 linear feet, equal to 66 miles, 1,106 linear feet.

†1900.—Total amount of new paving 358,402 linear feet, equal to 67 miles, 4,642 linear feet.

‡1901.—Total amount of new paving 338,742 linear feet, equal to 58 miles, 2,502 linear feet.

In addition to the work done by the City in the paving and repaving of streets with improved pavement, the following statement shows in detail the amount of work done by the passenger railway companies during the year 1901:

	Repaving. Linear feet.
Sheet asphalt (new)	5,246
Resurfacing sheet asphalt	3,784
Granite blocks	29,718
Granite blocks (old blocks relaid)	43,447
Vitrified bricks (new)	5,526
Total	87,721

Equal to 16 miles, 3,241 linear feet, at an estimated cost of $160,000.

Comparative Statement of Receipts.

Year.	Receipts.	Increase.	Decrease.
1901.....	$146,474 13	$10,418 40	
1900.....	136,055 73	.....	$6,108 47
1899.....	142,164 20		

Comparative Statement of Expenditures.

	1901.	1900.	1899.
Current expenses	$627,837 34	$1,055,865 38	$922,893 14
For extensions	1,995,375 86	1,991,807 31	1,584,729 38
Total	$2,623,213 20	$3,047,672 69	$2 507,622 52

Board of Highway Supervisors.

The report of the officers of this Board shows a very large increase in its net receipts.

The revenue received during the past year from the preparation of plans amounted to $27,722.06, being $16,-552.45 in excess of all expenditures. Ninety-seven (97) plans of substructures were added to the records of the Board, covering a distance of 20 miles, making a total of 263 miles of finished plans.

The plans made of the underground works, especially in the older sections of the City, are extremely valuable. This fact was fully demonstrated when we located the large mains for the improvement of the water supply and the high pressure fire service. By referring to the maps of the Board, the engineers engaged in laying said mains saw at a glance the physical difficulties to be overcome and were enabled to select the most available and least expensive locations, which, without the use of the maps, would have been a very difficult matter.

During the past year the Bell Telephone Company laid 11.32 miles of conduit and 27.34 miles of duct.

The Keystone Telephone Company laid 57.5 miles of conduit and 850 miles of duct.

The United Gas Improvement Company laid 31.3 miles of 8-inch mains and 1.4 miles of 10-inch mains and over.

The opening of streets for the purpose of laying under-

ground conduits, continues, and the outlook for a cessation of such work at an early day, is very unpromising.

Under the privileges granted by Councils, permission was given by the Board of Highway Supervisors for the opening of streets which practically amounted to the tearing up of all the streets in the business section of the City. The inconvenience of this is readily appreciated and its interference with the transaction of business is one of serious extent.

The only remedy for the present condition of our streets because of this work seems to be the construction of extensive subways, within which pipes, whether for gas, water or for wires, can be placed. This has frequently been referred to and recommended in reports made upon the subject by my predecessors.

The following is a statement of the number of permits issued during the year to the several companies maintaining underground structures:

Edison Electric Light Company	14
Union Tracion Company	9
Bell Telephone Company	393
The United Gas Improvement Company	445
Keystone Telephone Company	606
Pennsylvania Hospital	1
Total	1,468

The following is a summary of the transactions of the Board, of the work of the draughting division and of the receipts and expenditures for the years 1899, 1900 and 1901:

Transactions of the Board of Highway Supervisors.

Permits Authorized to be Issued.	1899.	1900.	1901.
For vaults	16	12	10
For railroad tracks, curves and turnouts	74	67	39
For underground pipes	9	15	450
For electrical conduits	578	569	1,023
For erecting bridges	4	1	4
For awnings	279	*63	
For tunnels	.....	2	
For platform scales	.....	1	1
For drinking fountain	.....	1	1

* Awnings transferred to Bureau of Highways by Ordinance of Councils, March 22, 1900.

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

	1899.	1900.	1901.
Plans of iron awnings furnished	295	*63	
New street record plans prepared	172	182	97
Blue print plans placed on file	246	159	147

Receipts and Expenditures.

	1899.	1900.	1901.
Receipts	$21,844 36	$15,864 71	$27,722 06
Expenditures	8,797 01	9,858 13	11,169 61
Excess of receipts	$13,047 35	$6,006 58	$16,552 45

Recapitulation.

	1899.	1900.	1901.
Amount of earnings	$25,117 39	$14,235 03	$32,230 54
Amount outstanding from previous years	2,256 18	5,529 21	3,764 24
	$27,373 57	$19,764 24	$35,994 78
Amount received and deposited with City Treasurer	21,844 36	15,864 71	27,722 06
Amount outstanding	$5,529 21	$3,899 53	8,272 72

Bureau of Street Cleaning.

The work of this Bureau during the year 1901, through the untiring efforts of its Chief, was of a very satisfactory character.

The streets were kept cleaner than they have ever been before in our City's history and the garbage and ashes have been removed regularly and promptly.

The expenditures of the Bureau were as follows:

For cleaning streets, alleys and inlets and the removal of ashes, etc.	$589,771 00
For the removal and disposal of garbage	440,833 00
For the removal of snow from City bridges crossing the Schuylkill river, etc.	369 50
For supervision of work and office expenses	23,369 98
	$1,054,343 48

While to the uninformed, this expenditure may seem large, yet it is much less than in any other large City with equal street area to supervise.

Penalties were imposed upon the contractors for violation of contracts, amounting to $6,843.00.

There were removed during the year from the City's streets, alleys and inlets, 178,495 cart loads of dirt. From buildings there were removed 639,833 cart loads of ashes,

30,472 cart loads of dry refuse, and 252,238 cart loads of kitchen garbage, a grand total of 1,101,038 cart loads of various matter.

The quantity of waste material handled each year is enormous and requires a thorough organization and constant and persistent supervision for its removal with the least possible inconvenience and discomfort to the citizens.

The very large amount of re-paving of streets, the laying of gas and water mains, the construction of sewers and the opening of streets for the building of conduits for telegraph, telephone and electrical wires, has rendered the work of keeping the streets clean more difficult than usual.

What is termed the "waste paper nuisance," has become a subject for serious consideration. This material which is placed upon the sidewalk to await the arrival of the collectors, being light, is caught up by the first wind that blows and scattered over the street surface, causing the streets to have a very untidy appearance. This matter has become so great a nuisance, that Councils should pass an ordinance prohibiting the placing of such waste on any of the public highways or sidewalks thereof, and provision should be made for the removal of all said waste under separate contract and direct from the buildings.

The most serious matter of the year in connection with the work of this Bureau, was the failure of the American Contracting and Manufacturing Company to comply with the provisions of their contract for the removal and disposal of garbage.

On January 1, 1901, they commenced work, but not having the facilities to dispose of the garbage collected each day, abandoned the work on January 7, 1901. They also failed to execute their contract and to deposit the required ten per cent. cash security with the City Treasurer. The $5,000 certified check, which accompanied their

proposal, was forfeited, and paid into the City Treasury and the City Solicitor requested to sue out the security entered upon their proposal bond. The work was re-awarded to the American Product Company, the next lowest bidder, less the time which the American Contracting and Manufacturing Company held the contract, no compensation being paid the latter company for the unsatisfactory work done by it.

On November 26, 1901, after public advertisement, proposals were received and contracts awarded to the successful bidders for the year 1902. The awards amounted to $1,210,790, an increase of 16.7 per cent. Part of the increase is due to the increase in the number of houses from which ashes, garbage, etc., are to be removed, and to the extension of the streets and the frequency which certain sections of the city are required, under the contracts for the current year, to be cleaned. Also to the scarcity of dumping grounds, which, owing to the expansion of the City, are becoming less numerous and further away from the collection districts.

It is becoming an old, old story, but I again recommend that if proper legislation were enacted to permit the making of contracts for a period of three or more years, it would invite a wider competition among bidders and the work would be better done and at less cost than under the present system of one year contracts.

The following is a statement in detail of the operations of the Bureau of Street Cleaning during the year 1901; also the totals for the years 1899 and 1900:

Total Work during the Year 1901.

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	415,767	37,522	189,107	23,612	614	.....	2,653	45,377	117,643	5,036	41,020	1,946
Second	408,747	41,540	195,499	34,246	1,216	.....	2,981	47,984	116,909	6,121	44,711	2,374
Third	248,065	17,598	82,597	14,300	293	.....	3,011	13,332	65,036	3,195	52,167	902
Fourth	523,672	49,182	403,091	26,662	.....	179	3,253	38,493	182,373	5,609	60,776	4,247
Fifth	426,037	27,545	133,657	24,699	.....	2,868	2,855	21,410	158,022	10,511	53,564	1,168
Sixth	23,851	.....	30,378	3,962	.....	1,248	.....	11,899	.....	.....	.....	31
Total 1901	2,046,139	173,387	1,034,329	127,481	2,123	4,295	14,753	178,495	639,883	30,472	252,238	10,668
Total 1900	2,154,611	*.....	1,128,423	261,790	2,174	17,548	10,532	192,125	568,636	15,253	224,256	2,248
Total 1899	2,048,454	*.....	1,411,787	501,070	2,156	22,817	8,702	202,799	625,459	.....	199,357	2,222

* Prior to the year 1901 the cleaning of alleys was not under the jurisdiction of the Department of Public Works.

Bureau of Gas.

The operations of this Bureau are performed without any expense whatever to the City.

The Bureau was established under the terms of the lease of the Philadelphia Gas Works to The United Gas Improvement Company, and said company deposits annually in the City Treasury, the sum of $10,000 to pay the expenses of its operation, which sum is subsequently appropriated to the Bureau.

The expenditures for the past year were	**$9,920 81**
There was transferred	**79 00**
Merged	19
	$10,000 00

The gas consumer, if he thinks the bill rendered him is in excess of the amount of gas consumed, has redress through this Bureau. The lease with the The United Gas Improvement Company contains the following provision:

"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."

During the past year there was a slight increase in the number of meters submitted by consumers for examination, in order to settle disputes about the accuracy of gas bills. Twenty-two (22) requests were made for this purpose, two of which were subsequently withdrawn. Six of the meters tested proved to be either slow or correct and fourteen fast.

At the gas testing stations, we have been provided with all the facilities for investigations necessary to ascertain the illuminating value and quality of the gas. The most

recent and approved methods are employed in the photometrical examination of gas and the results for the past year have been extremely satisfactory.

The average candle power of the daily tests was as follows:

January	22.80
February	23.10
March	23.03
April	22.99
May	22.99
June	22.94
July	22.80
August	22.90
September	22.70
October	22.70
November	22.70
December	22.60
Maximum monthly average	23.10
Minimum monthly average	22.60

The quality of the gas is quite uniform and the following results obtained from chemical analysis will indicate its average composition with considerable accuracy:

Carbon di-oxide	2.70
Illuminants	11.40
Oxygen	.35
Hydrogen	33.75
Carbon mon-oxide	19.40
Methane	27.90
Nitrogen	4 50
	100.00

The heating value of the gas was determined by Junker's Calorimeter, which showed 700.4 British Thermal Units per cubic foot.

There is a general advance in the methods adopted for the utilization of gas for illumination and fuel, and a more universal use of this product than heretofore. The United Gas Improvement Company, recognizing this fact, continue

making improvements to the plant, employing the most efficient methods in order that there shall be the largest yield of the best products possible. The high quality of gas supplied to the consumer has been maintained. Improvements in the distribution system have also been made, so that all sections of the City are furnished with an adequate and constant supply.

Bureau of Lighting.

The lighting of the streets of the City is by electric lights, gas and gasoline lamps. The total number of lamps lighted and under the supervision of this Bureau on December 31, 1901, was as follows:

Gas lamps maintained by The United Gas Improvement Company	20,373
Gasoline lamps furnished by the Pennsylvania Globe Gas Light Company	14,355
Gas lamps maintained by the Northern Liberties Gas Company	77
Gas lamps maintained by the Department of Charities and Correction	123
	34,928

In addition to the gas and gasoline lamps, there are 9,033 electric arc lights under the care of the Department of Public Safety (Electrical Bureau), and fifty (50) electric arc lights maintained by the Board of Directors of City Trusts and located on Delaware avenue and Front street, between Vine and South streets.

The total number of lighted lamps of all descriptions on December 31, 1901, was 44,011.

The work of the The United Gas Improvement Company during the past year has been entirely satisfactory; the gas lamps have been lighted and extinguished regularly and kept in excellent condition, and the erection of new lamps, removals, discontinuances and relocations, have received prompt attention.

The three hundred new gas lamps which The United Gas Improvement Company are required, under the terms of the lease, to erect annually, continues and will continue to be insufficient to meet the demands of operative builders for gas lamps upon the streets of their operations and on streets authorized by Councils to be paved.

To meet this deficit of gas lamps, the The United Gas Imprcvement Company, upon request from this Department, discontinue the lighting of certain gas lamps because of their proximity to electric lights and re-erect them in locations designated by the Chief of Bureau of Lighting.

The gasoline lamps furnished by the Pennsylvania Globe Gas Light Company, under its contract with the City, have been kept in good repair and lighted with regularity throughout the year.

The contract of the Pennsylvania Globe Gas Light Company, for furnishing and maintaining naphtha lamps of the Maloney Company patent, was authorized and continued from year to year, in accordance with the provisions of the Ordinance of Councils approved December 31, 1878. On April 2, 1901, an ordinance of Councils was approved, repealing this ordinance and authorizing the Mayor of the City to notify the present contractors for furnishing and maintaining lamps of the Maloney Company patent, that their contract shall cease on December 31, 1901.

The ordinance of Councils approved December 31, 1901, making appropriation to this Department, contained a proviso instructing the Director of the Department of Public Works to advertise not later than June 1, 1901, for proposals for lighting the City with naphtha lamps of twenty (20) candle power or other lamps of equal candle power, during the year 1902.

In accordance with the instructions contained in this proviso, after public advertisement, proposals were re-

ceived on June 14, 1901, and contract awarded to the Pennsylvania Globe Gas Light Company for furnishing naphtha lamps of guaranteed candle power during the year 1902, as follows:

Welsbach incandescent lamps of sixty (60) candle power ..... $29.50 per lamp per year.
Plate burner lamps of twenty (20) candle power ..... $21.00 per lamp per year.

The ordinance of Councils approved December 20, 1901, authorizes the Director of the Department of Public Works to relocate and abandon such number of gasoline lamps now in use as shall permit of the introduction of the improved Welsbach incandescent gasoline lamp of sixty (60) candle power, providing the cost of lighting with naphtha lamps shall not exceed the amount appropriated.

A thorough inspection of the locations of all gasoline lamps has been made and in the early part of the ensuing year, the gasoline lamps located upon the roads and streets of the City will be readjusted; the old style lamps will be abandoned wherever practicable and the improved Welsbach incandescent lamp substituted. When this work is completed, the streets and roads on which this style lamp will be located, will be better and more satisfactorily lighted than at present and at no additional expense.

The following comparative statement shows the number of gas and gasoline lamps, also the expenditures of the Bureau of Lighting during the years 1899, 1900 and 1901:

	1899.		1900.		1901.	
	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	*19,922	.....	*20,137	.....	*20,495	
Gasoline lamps	13,314	$279,559 61	13,966	$286,268 59	14,355	$298,383 14
Gas lamps supplied by the Northern Liberties Gas Company	92	1,858 44	80	1,693 13	77	1,587 97
Gas lamps maintained by the Bureau of Correction	*236	.....	*231	.....	*231	
Salaries and office expenses	.....	5,758 44	.....	6,572 20	.....	6,393 46
Total	33,564	$287,176 49	34,414	$294,533 92	35,158	$306,364 57

* Not lighted because of proximity to electric lights.

	1899	1900	1901
Under care of The United Gas Improvement Company	180	166	122
Under care of Bureau of Correction	108	108	108

City Ice Boats.

The three City Ice Boats in thorough condition of repair, and ready for service at an hour's notice, remained at their dock until February 5, 1901. On this date, ice having accumulated in such quantity as to become an obstruction to navigation, Boat No. 3 was placed in commission. On the following day, Boat No. 2 was ordered out and on February 9, Boat No. 1 was also ordered in commission.

All three boats continued in active service until March 9, when they were ordered out of commission and returned to their dock.

The condition of the river from February 5 to March 9, 1901, owing to the heavy ice, was extremely bad and the usefulness of the City Ice Boats was fully demonstrated, for, by their efficient service, the channel of the river was kept open, affording free ingress and egress to all shipping entering the Port of Philadelphia.

During the past summer, the dock at the House of Correction has been dredged and repairs made to all three boats as far as the limited appropriation would permit and at the date of this report, the boats are ready to go into commission should their services be required.

During the year, $37,621.80 were expended for repairs and general maintenance and $558.60 received from the sale of old material, was paid into the City Treasury.

The following tables give a comparative summary of the receipts and expenditures of the City Ice Boats for the years 1899, 1900 and 1901:

	1899.	1900.	1901.
Amount received for towage and assistance rendered		$1,250 00	$500 00
Amount received for sale of material	$72 45	65 39	58 60
Total paid to City Treasurer	$72 45	$1,315 39	$558 60

	1899.	1900.	1901.
Total amount of warrants drawn	$20,834 70	$29,949 05	$37,621 80
Deduct cash paid City Treasurer	72 45	1,315 39	558 60
Total	$20,762 25	$28,633 66	$37,063 20

Director's Office.

The regular work of the Director's Office, incident to the current business and to the extensions planned and prosecuted during the year, was promptly met by the clerks and employees in the most satisfactory manner. With the vast amount of work done during the past year, it has been beyond our control to prevent some temporary inconvenience to the citizens while the work was in progress, but it has been, and will continue to be, the constant aim of this department to reduce it in every possible way consistent with the great amount of work necessary to be accomplished.

The following is a comparative summary of the expenditures of the Director's Office for the years 1899, 1900 and 1901:

Item.		1899.	1900.	1901.
1	Salaries	$20,420 00	$20,560 00	$20,447 50
2	Keep of horses	1,400 00	1,390 00	1,190 00
3	Printing stationery, etc	2,438 42	2,353 97	2,367 05
4	Appraisement of Philadelphia Gas Works	2,750 00		
5	To pay bills for gas pipe, etc	455 79		
6	To pay Pennsylvania Railroad Company for expenses incurred in removing debris washed upon tracks at Powelton avenue and for expenses incurred in repairing round house and tracks at Thirty-first and Powelton avenue	437 70		
4	To reimburse John J. Cassidy for gas pipe paid for by him	.....	175 50	
5	To pay a verdict obtained against Thomas L. Hicks and Patrick McGinn	.....	436 03	
	Total	$27,901 91	$24,915 50	$24,004 55

Receipts and Expenditures.

The appropriations, receipts and expenditures of the Department of Public Works for the year 1901, are set forth in the following table in detail by Bureaus, and in totals for the years 1899 and 1900.

The following is an abstract from the ordinance making an appropriation to this department for the year 1902, with a statement of the balances available from previous years for work ordered and for which contracts have been executed:

Bureaus.	Annual Appropriation for the year 1902.	Balance Available from Previous Years.	Total.
Director's Office	$24,820 00	.....	$24,820 00
City Ice Boats	25,830 00	.....	25,830 00
Gas	10,000 00	.....	10,000 00
Highways	1,609,896 80	$331,405 89	1,941,302 69
Lighting	320,500 00	.....	320,500 00
Street Cleaning	1,239,110 00	.....	1,239,110 00
Surveys	780,860 00	2,137,754 38	2,918,614 38
Water	800,843 00	12,263,915 91	13,064,758 91
Total	$4,811,859 80	$14,733,076 18	$19,544,935 98

To the Chiefs of the several Bureaus comprising this Department, my assurance is given that I sincerely appreciate their earnest endeavors to faithfully fulfill every requirement of their trust; and their honest and intelligent administration of the important duties incident to their several positions has my unqualified approval.

To the mastery of the details of this Department, I have given my earnest study and unremitting labor.

In conclusion, I can but inadequately express my sincere appreciation and thanks for the honor of your continued confidence in me and in the administration of the affairs of this Department.

Very truly yours,

WM. C. HADDOCK,

Director.

C WORKS DURING THE YEAR 1901,

nce able 2.	Total.	Amount merging.	Receipts.	Number of employes Dec. 31, 1901.
.....	$24,004 55	$815 45	.....	9
.....	39,001 80	375 20	$558 60	22
.....	9,999 81	19	6 00	6
405 89	2,969,719 15	4,701 67	146,474 13	125
.....	.....	.....	27,722 06	12
.....	307,014 57	516 43	.....	4
754 38	1,070,268 98	548 02	.....	14
.....	3,863,496 22	4,305 21	39,721 43	*377
.....	.....	.....	105,280 53	13
915 91	15,751,024 96	26,924 52	3,331,437 45	1,124
076 18	$24,034,530 04	$53,186 69	$3,651,200 20	1,706
478 80	$17,559,045 07	$46,519 89	$3,580,451 18	1,995
254 02	$12,498,361 16	$96,761 73	$3,436,843 44	1,638

* Includes 130 employed on the Corps for the Improvement, Extension and Filtration of the Water Supply

ANNUAL REPORT

OF THE

BUREAU OF WATER

For the year 1901

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. DE HAVEN.

Chief Draughtsman,
JOHN E. CODMAN.

Draughtsmen,
Martin Murphy, John R. Gorman, James H. Hand, Jr.,
Charles B. F. Waller, Harry J. Lentz.

Assistants to Chief Clerk,
Thomas Spence, A. H. Raven.

Time Clerk—Wm. J. Innes.
Clerk—George G. Whitby.
Assistant Clerk—Kennedy McNeal.
Assistant Search Clerk—John J. Maxwell.
Assistant Clerk—John J. Barney.
Pipe Inspector—Theodore S. S. Baker.
Pipe Clerk—Charles H. Pyrah.
Messenger—Haines Lewis.
Janitor—David Richards.
Watchman—James Robinson.
Watchman—George Harper.

Telephone Operators,

Jennie M. Hannings, Calvin Cramer.

Permit Clerk—Thomas Orr.

Assistant Permit Clerk—Chas. H. Russell.

Chief Inspector—Edward Harshaw.

Inspectors,

Wm. A. Agnew,	John A. Brown,
Lewis Obermiller,	George W. Eckert,
Theo. Yeager,	Frank Sloan,
Jas. Buchanan,	George Spence,
George Crook,	Hillary Connor,
Henry Homiller,	Harrison D. Bates,
Wm. J. Reed,	Owen Jones,
John Van Dusen, Sr.,	Thos. G. Morris,
George Hoffman,	John T. Gault,

John McGrory.

Assistant to General Superintendent—Wm. Laumaster.

Clerk and Paymaster—Frank Hohlfeld.

Assistant Clerk—John B. Wright.

Works--General.

Foreman Machinist—Robert Bromiley.

Foreman Bricklayer—Lewis Myers.

Foreman Carpenter—Henry Guest.

Foreman Stonemason—Michael Farrell.

Foreman Painter—Joseph Work.

Foreman Rigger—James Forrest.

Foreman Laborer—Wm. Calhoun.

Foremen of Repairs,

B. Philips, D. H. Rose, E. N. Sampson.

H. W. Wallen to August 18, 1901.

General Storekeeper—John A. Acker.

Storekeepers,

Daniel D. Todd. Wm. F. Glenn.

Electrician—Henry F. Morgan.

Lineman—D. McDougall.

CONSTRUCTION AND REPAIR SHOP, Twelfth and Reed Sts.

Superintendent of Shop—James H. Dean.
Clerk—Morris P. Getz.
Watchman—John W. Watkins.

Purveyors' Districts.

First District Office, 1120 Wharton street.

Purveyor—John H. Holmes.
Clerk—Wm. J. Mackey.
Assistant Clerk—James McCracken.
General Foreman—Thos. Preston.
Foreman of Repairs—W. W. Wellington.
Hydrant Inspector—James Preston.
Watchman—John H. Peterson.

Second District Office, 918 Cherry street.

Purveyor—David A. Craig.
Clerk—Chas. H. Green.
Assistant Clerk—Fred. J. Gheen.
General Foreman—Michael Young, to April 1, 1901.
Foreman of Repairs—Edw. Homan.
Hydrant Inspector—Robert S. Hughes.
Watchman—J. D. Kirkpatrick.

Third District Office, Beach street and Susquehanna avenue.

Purveyor—Charles J. Lowry.
Clerk—J. A. Spanagle.
Assistant Clerk—Milton Fredericks.
General Foreman—Elias Abrams.
General Foreman—James Hutchinson.
Foreman of Repairs—Wm. P. Yetter.
Hydrant Inspector—Thos. P. Cowden.
Hydrant Inspector—Henry Flake.
Hydrant Inspector—Wm. Gerstner.
Hydrant Inspector—Jno. R. Horn.
Watchman—Jas. H. Jebbs.

Fourth District Office, Twenty-sixth and Master streets.

Purveyor—John Montgomery.
Clerk—Philip S. Thomas.
Assistant Clerk—Jay T. Wilson.

Assistant Clerk—Wm. W. Davis.
General Foreman—George W. Showaker.
Foreman of Repairs—John Richards.
Yardman—Thos. F. Kelley.
Hydrant Inspector—Wilson Lancaster.
Hydrant Inspector—John C. Smith.
Watchman—James S. Fleet.

Fifth District Office, 4377 Manayunk avenue.

Purveyor—Charles T. Preston.

Clerk—F. J. Cornman.
General Foreman—Wm. H. Dawson.
Hydrant Inspector—Jos. R. Gardy.

Sixth District Office, Town Hall, Germantown.

Purveyor—George W. Bardens.

Clerk—Robert Howat.
Assistant Clerk—Daniel L. Stewart.
General Foreman—Jos. B. Fowler.
Foreman of Repairs—John L. Cameron.
Hydrant Inspector—Geo. W. Clemens.

Seventh District Office, Thirtieth and South streets.

Purveyor—Michael Young.

Clerk—John F. Mahaun.
Assistant Clerk—Jas. S. Ashworth.
General Foreman—Jas. H. Tawney.
Watchman—John C. Bishop.
Watchman—Jacob H. Boon.

ANNUAL REPORT

OF THE

BUREAU OF WATER

FOR THE YEAR 1901

FIFTEENTH ANNUAL REPORT

OF THE

BUREAU OF WATER

ONE HUNDREDTH ANNUAL REPORT

OF

OPERATIONS CONNECTED WITH THE CITY WATER SUPPLY

Philadelphia, January 2, 1902.

WILLIAM C. HADDOCK, ESQ.,
Director, Department of Public Works.

DEAR SIR:—I have the honor to submit the following report of operations connected with the Bureau of Water for the year 1901.

This is the one-hundredth annual report since the construction of the first municipal water works at Centre Square, Broad and Market streets, and the following data show, in a measure, the progress made since that time:

	1801	1901
The population was	41,220	1,321,304
Total pumpage capacity	4,400,000 gals.	468,540,000 gals.
Average daily consumption	400,000 gals.	279,975,453 gals.
Average consumption per cap. per day	10 gals.	211.9 gals.
Number of feet of water pipe in service	29,263 feet.	7,087,089 feet
Total revenue from water rent, etc., to date	$65 00	$76,744,805 57
Total expenditures to date	206,237 27½	51,655,136 52
Total revenue paid into the City Treasury and used, in excess of all expenditures to date (Dec. 31, 1901) for other municipal purposes.		$25,089,669 05

Revenue Collected.

The total collections during the year 1901, and the increased amount as compared with that for the year 1900, were as follows:

Water rents	$2,952,520 06	
Meter rents	190,475 84	
Frontage	132,467 83	
Penalties	40,775 63	
New connections	7,549 00	
Searches	2,322 75	
Miscellaneous	5,326 34	
Total collections for 1901		$3,331,437 45
Total collections for 1900		3,249,195 24
Net increase		$82,242 21

The total collections for the three years ending December 31, 1901, as compared with the previous corresponding period ending December 31, 1898, are as follows:

1899, 1900 and 1901	$9,704,586 89
1896, 1897 and 1898	8,916,156 64
Showing an increase in the amount collected during the first-named period of	$788,430 25

Expenditures.

The expenditures for maintenance, service mains, etc., were	$1,524,201 00
The expenditures for improvements and extensions were	1,945,159 21
Total expenditures during 1901	$3,469,360 21
The total expenditures for maintenance and extensions during 1899, 1900 and 1901	$7,583,975 67
During 1896, 1897 and 1898 were	4,986,760 94
Total increase of expenditures during the first-named period	$2,597,214 73

The increase of expenditures, amounting to $2,597,-214.73, during the three years ending December 31, 1901, over and above the amount expended during the three preceding years, was due to the normal annual increase of work performed by this Bureau (which necessitates during each succeeding year a greater expenditure for maintenance), and to the unusual extensive additions and repairs to pumping stations, engines, boilers, etc., which were absolutely necessary to provide means to supply the daily demands for water.

All such improvements contemplated in 1899, and at that time considered imperative in order to relieve the then critical condition of the water supply of the City, have been completed, and there is now no serious apprehension of a water famine in the near future through any deficiency in the capacity of the works to furnish all the water required, excepting, possibly, in the event of a serious break-down of one or more of the engines at the Queen Lane or the Spring Garden works.

The expenditures were also increased to an unusual extent, especially during the past year, by large amounts chargeable to the construction of the filtration plants and their appurtenances, in which work considerable progress

has been made. The construction of the Lower and the Upper Roxborough and the Belmont filter plants is well advanced, and the former will be in service early in the current year.

Of the 21.6 miles of proposed distributing mains (now under contract) from the clear-water basins to the several districts to be supplied with filtered water, 10.94 miles, or 49.3 per cent., have been laid, and all such work is being pushed to completion as rapidly as the weather conditions will permit.

A full report, by Mr. John W. Hill, Consulting Engineer, relative to the plans and work performed under the several contracts pertaining to the Improvement, Extension and Filtration of the Philadelphia Water Supply, accompanies this report. (See Appendix F.)

A large sum has also been expended on the independent fire main service, 72 per cent. of the work thereon being now completed.

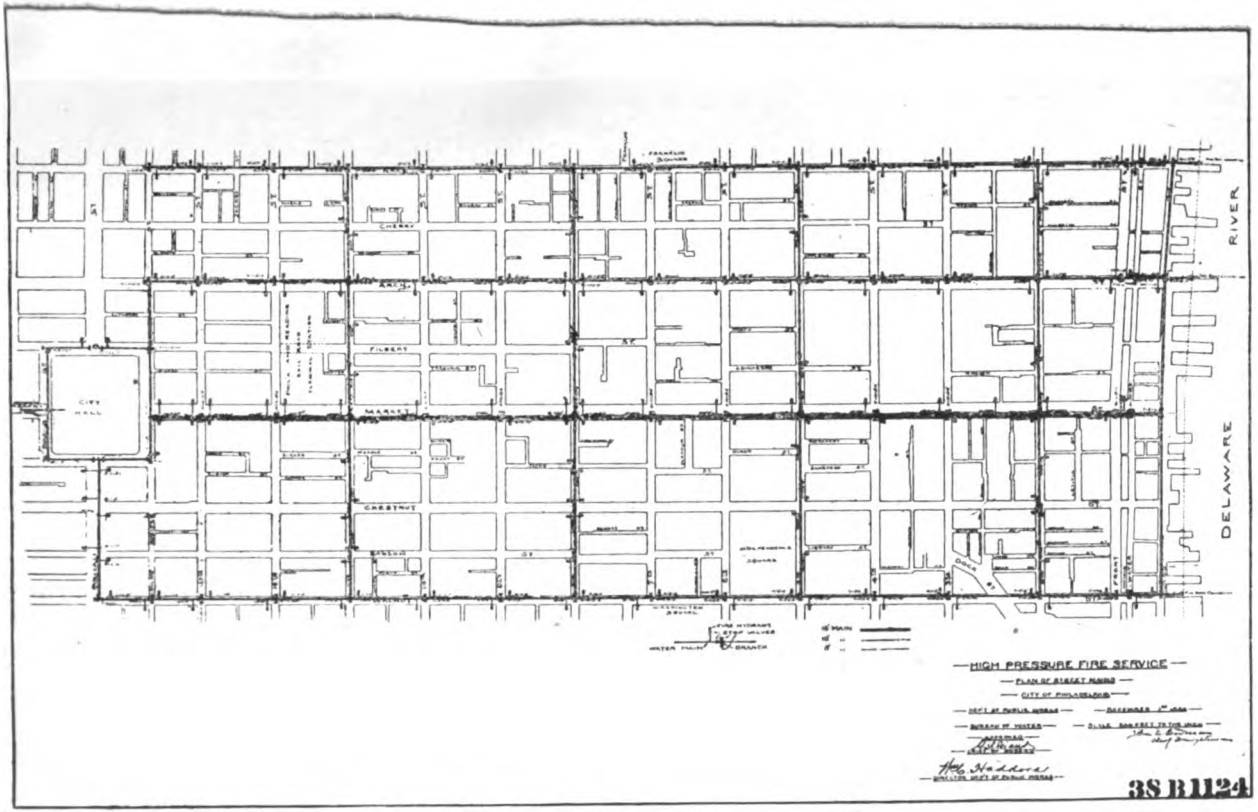
The total expenditures for this item to December 31, 1901, amounted to $194,251.72, which includes pipe castings on hand, but not yet laid, costing $15,024.14.

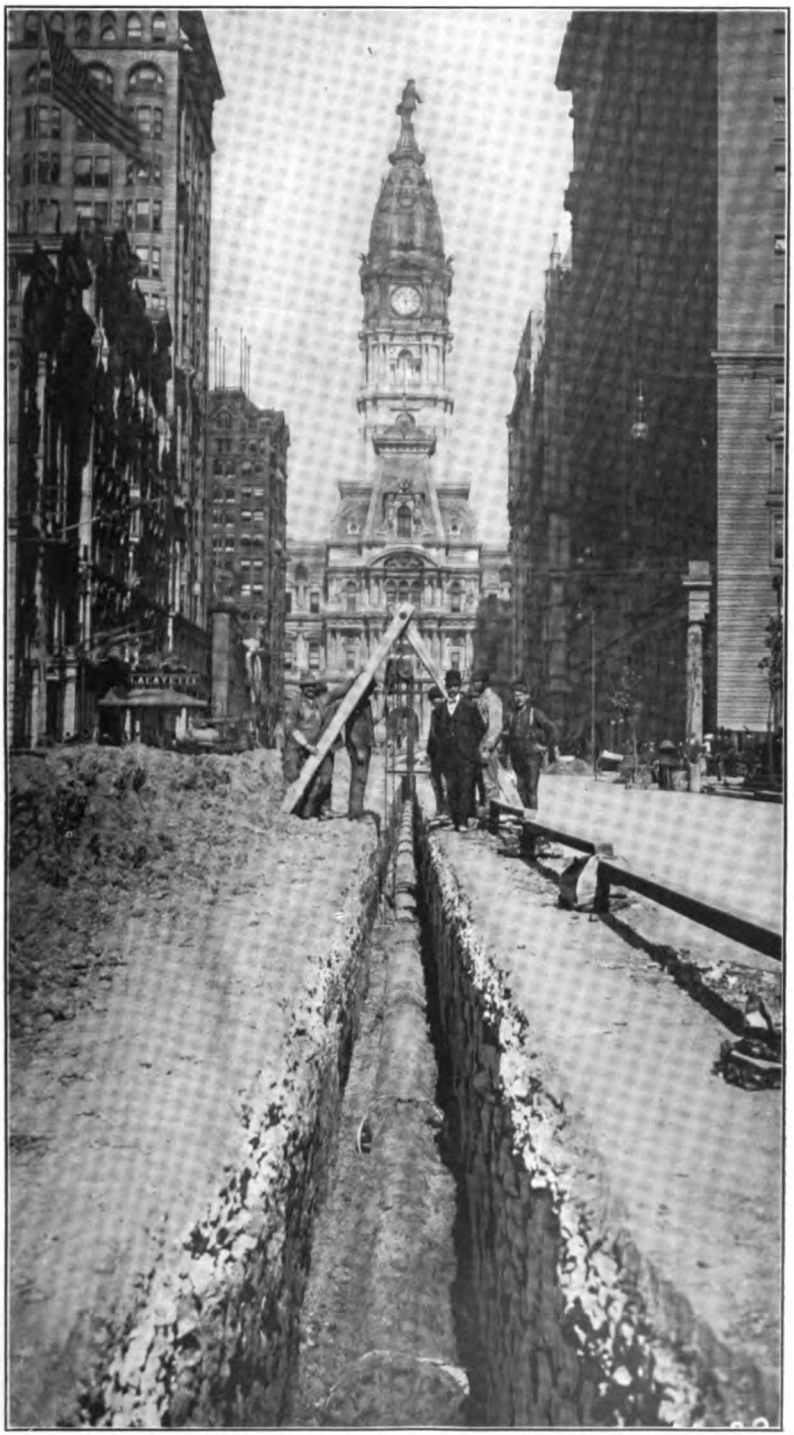
Independent Fire Service.

With respect to this work I have to state that, on November 15, 1900, Councils appropriated $300,000 for an independent high-pressure fire service, to be constructed within the area bounded by Delaware avenue, Broad, Race and Walnut streets.

Upon the passage of this ordinance, plans were immediately prepared showing the streets in which the fire pipes were to be laid, together with standard drawings for the different sizes of pipes, stop boxes, special castings, etc.

Upon approval by you of the general plan embracing the area to be covered, a very careful study was made of all available data on file in this Bureau, in the Bureau





LAYING NEW HIGH PRESSURE FIRE MAIN ON BROAD STREET.

of Surveys and in the office of the Board of Highway Supervisors, to determine the most economical locations in which to lay mains in the streets, and from this study over 100 detail drawings were made, besides 60 drawings of standard curved pipes necessary for deflecting the pipe lines to avoid obstructions encountered during the prosecution of the work.

Drawings showing the dimensions of the pipes, special castings, fire boat connections, etc., are herewith submitted.

On April 20, 1901, the contract for furnishing and laying the fire mains, including all appurtenances except fire hydrants, was awarded to the Hoffman Engineering and Contracting Company, of Philadelphia.

The contract price was $274,000, and $26,000 was reserved from the appropriation to be used in payment for inspections, the purchase and setting of fire hydrants, and the salaries of the engineering staff.

The work of laying the mains was begun, on May 20, 1901, at Delaware avenue and Arch street, and was prosecuted from this, as well as from other points, as rapidly as the pipe materials could be obtained.

Fire mains have been completed, and tested under a static head of 400 lbs. to the square inch, in the following named streets:

Race street, from Del. river to Eighth street, 12-inch..	3,747 ft.
Arch street, from Del. river to Eighth street, 12-inch..	3,697 ft.
Market street, from Del. river to Juniper street, 16-inch	5,200 ft.
Walnut street, from Del. river to Eighth street, 12-inch	3,600 ft.
Delaware avenue, from Race to Market street, 8-inch..	1,443 ft.
Second street, from Race to Walnut street, 8-inch....	2,538 ft.
Fifth street, from Race to Walnut street, 8-inch.....	2,540 ft.
Eighth street, from Race to Market street, 8-inch....	1,366 ft.
Eighth street, from Chestnut to Walnut street, 8-inch	542 ft.
Broad street, from Walnut to Chestnut street, 12-inch	520 ft.
Hydrant connections 8-inch	700 ft.
Total	25,893 ft.

Thirty-three (33) fire hydrants, or 20 per cent. of the whole number, have been set, and the balance are now being placed in position as rapidly as possible.

Three (3) fire boat connections (all that are contemplated for this work) are in place; one, east, at Race, Arch and Walnut street, on the Delaware river, and the entire system of mains between Delaware avenue and Eighth street is about completed and will be ready for service early in the year.

Materials are collecting for the balance of this work, which will be pushed to completion as rapidly as the weather conditions will permit.

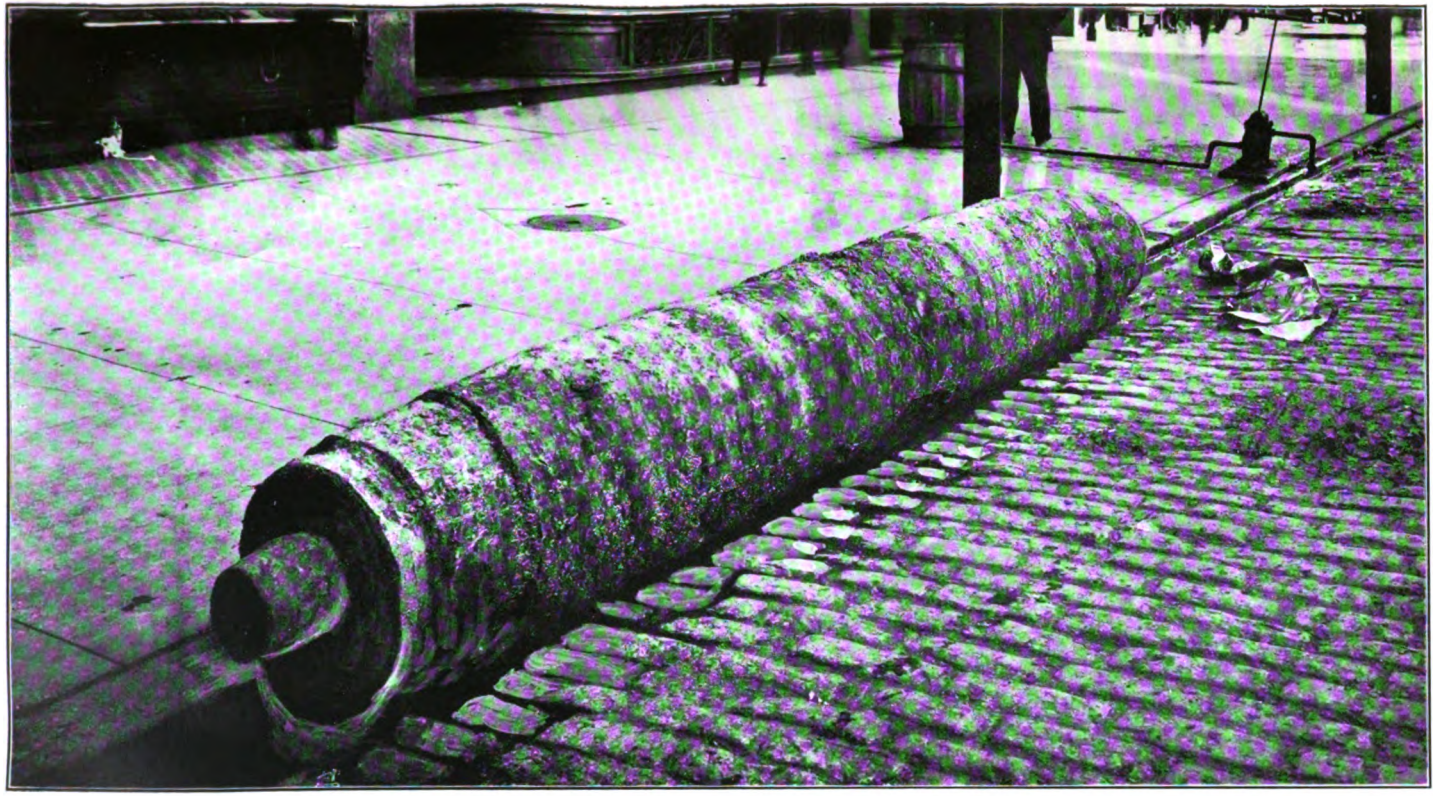
It was fully expected that the work would be farther advanced by this time, but unavoidable difficulties, which could neither be anticipated nor provided for, were encountered, and these greatly retarded the work.

Another delay was caused by the suspension of operations, during the holiday shopping season, on Market, Arch, Race and Eighth streets.

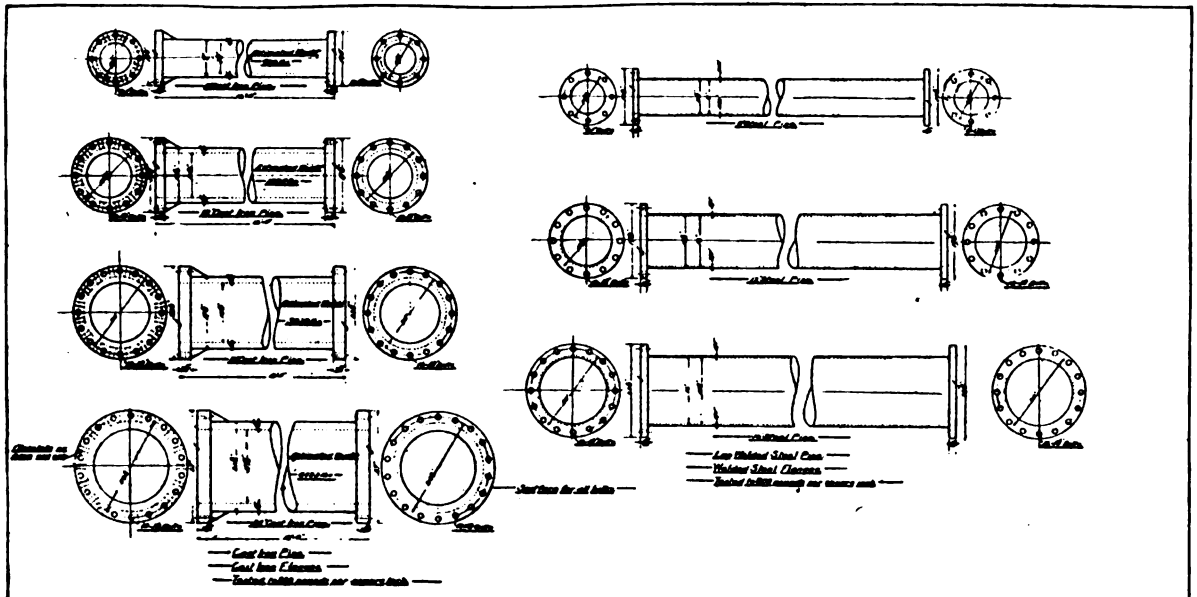
The progress of the work was further impeded by the failure of the manufacturers to furnish promptly the pipe and special castings, which were of unusual thickness and weight, the latter being especially difficult to manufacture, owing to their liability to check when cooling.

While laying the mains, many underground obstructions which were not of record on the plans at the office of the Board of Highway Supervisors were encountered, and sewers, pipes, electric, conduits, etc., were frequently found not located as shown on the plans. In some instances the masonry walls of pavement vaults extended into the street and had to be cut away to make room for the mains. These required, in the prosecution of the fire main work, alterations which could be made only after the discovery of such discrepancies. In some cases, special castings had to be provided to deflect the line of the

SECTIONS SHOWING METHOD OF CONNECTING WOODEN WATER PIPE.



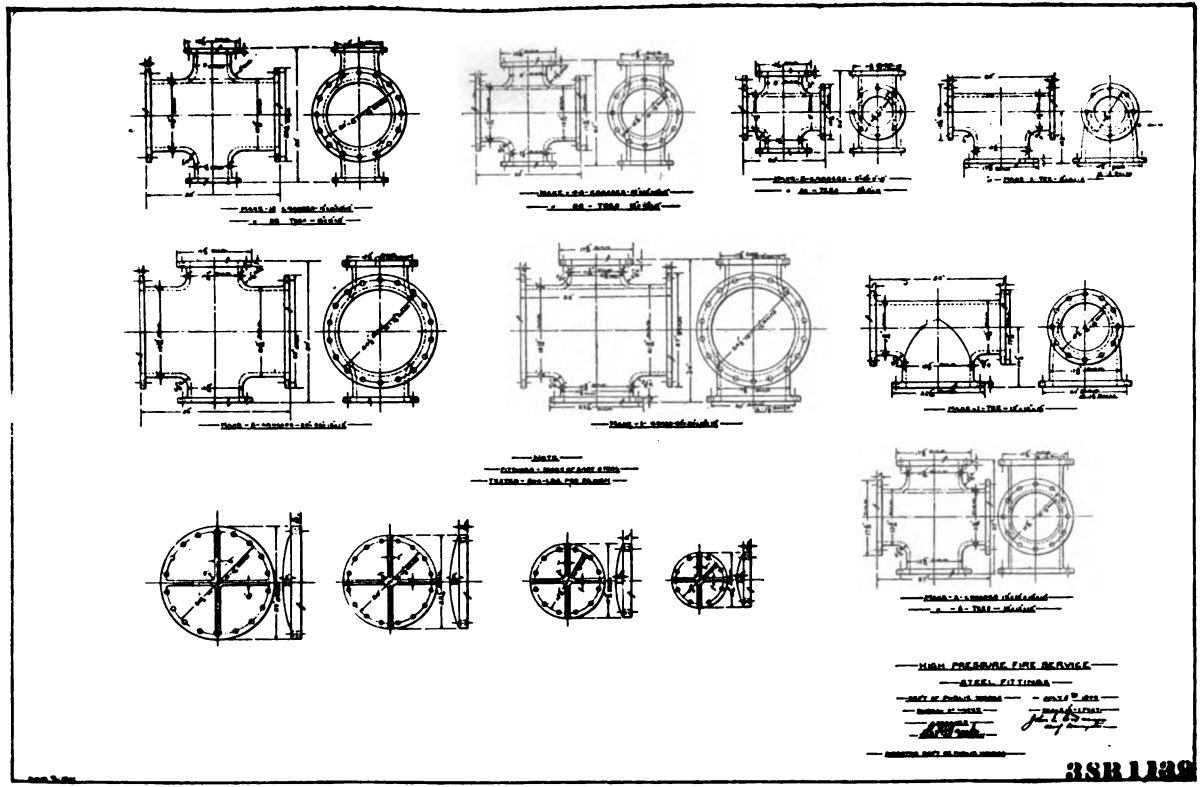
Wooden Water Pipe, Laid 1801, Taken up 1901.

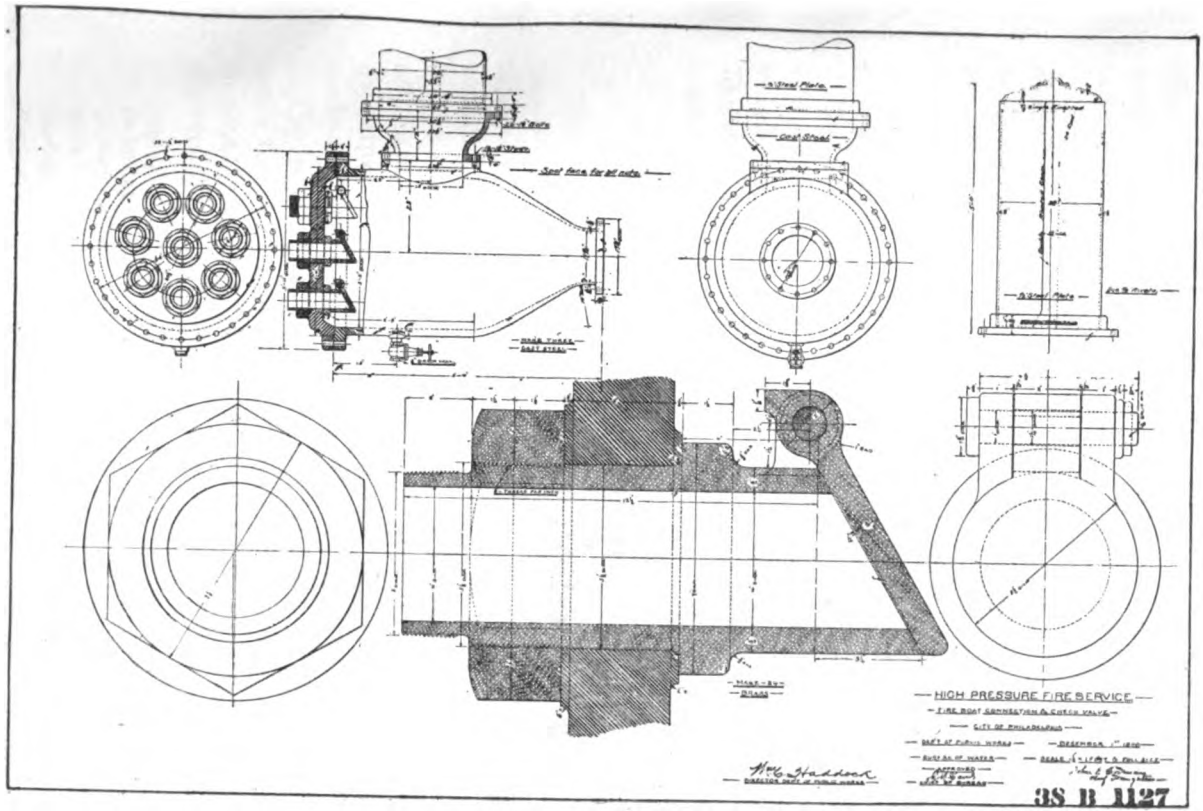


High Pressure Fire Service.

Cast Iron and Steel Pipes.

38B1125





pipe; in others, the removal of obstructions consumed much time which otherwise would have been employed on the fire main proper.

Considerable difficulty was experienced in laying the mains across streets—no less than fifteen special castings being required to lay a certain fire connection across Market street. All of this work was done in the City's busiest streets, and in its prosecution every possible effort was used to avoid giving cause for complaint from property owners and citizens along the fire pipe line.

The engineering corps in charge of laying the fire service mains consisted of one engineer, having general supervision over the work, two draftsmen and one inspector. The total expense for their services, from March 1 to December 31, 1901, was $3,043.94.

House-to-House Inspections.

The reinspection of all properties in the City in order to ascertain the correct amount of water rents to be charged against each, which work was begun in April (1900), was completed August 15, 1901.

The total number of inspections amounted to 248,226, and, in cases where inspectors' reports appeared in any way doubtful, reinspections—approximately over 5,000—were made to insure the correctness of their work.

The number of properties found having water appliances for which no water rents were being paid amounted to 40,418, and the total number of delinquent appliances discovered was 70,660, as follows:

Aquariums	4
Bakeries	160
Barber shops	438
Bars	24
Basins	8,104
Basins (office)	1,186
Baths	5,843

Baths (foot)	7
Baths (shower)	13
Beer motors	65
Bidets	31
Blacksmith shops	1
Boilers (heating)	311
Boilers (steam)	367
Bottling establishments	12
Bottling tubs	36
Carriages	2,249
Cars	67
Cellar drainers	4
Cellar spigots	756
Coloring rooms	3
Conservatories	87
Cooling tubs	4
Drug stores	22
Dwellings (rear half)	1,253
Dye house machines	214
Elevators	83
Engines (gas)	162
Engines (road)	1
Engines (shifting)	4
Forges	158
Fountains (drug stores)	115
Fountains (in yards)	33
Gang men	1
Glass houses	16
Green houses	83
Grindstones	57
Hatter's planks	5
Horse troughs	30
Hydrants	4,336
Hydraulic presses	4
Laundries	174
Lawn sprinklers	95
Locomotives	1
Milk houses	362
Photographic galleries	28
Pools	6
Printing offices	20
Restaurants	418
Scouring establishments	1
Screw nozzles	1,746
Sinks (pantry)	421

Sinks (slop)	19
Slaughter houses	37
Stalls (cow)	301
Stalls (horse)	8,936
Starch boxes	3
Urinals	746
Vats	297
Wash paves	4,139
Washing machines	95
Wash tubs	3,624
Water closets	22,842
Total	70,660

The water rents chargeable for these fixtures amount to $146,057.35, nearly all of which, during the past year, has been collected.

The total expense to the City for the work of inspection, extra clerks, etc., was $26,447.76, leaving a net profit of $119,609.59, while for succeeding years the whole amount, $146,057.35, will be all profit.

The average amount of delinquency for each Ward was	$3,562 38
For each property delinquent	3 62
The average cost of inspection for each Ward was	645 07
For each property delinquent	66
For each property inspected	11

The inspectors engaged upon the work, as well as the clerks whose duty it was to enter of record the inspectors' daily reports, were appointed as laborers and paid laborers' wages only. Considerable credit is due them for the effectual services rendered for such slight remuneration.

Decreased Consumption.

The total consumption of water throughout the City was 102,191,040,693 gallons, or at the average rate of 279,975,453 gallons per day—a decrease, as compared with that of last year, of 2,632,444,307 gallons, or 7,212,177 gallons per day.

The reduction in the quantity of water consumed (which is determined from the pumpage records) does not represent an actual decrease in the supply to consumers, but a greater efficiency of the pumps. In other words, the pumping machinery is in better condition than it has been for a number of years, and the quantity of water discharged is somewhat greater for each stroke of the pump, therefore fewer pump strokes are necessary to supply the demands and fewer revolutions are recorded by the engine counter.

This is proven by the pumpage at the Belmont Station, where new and improved engines have been constructed, the reduction in the quantity of water pumped at this station, as recorded by the engine counters, being five (5) per cent. less than that of the preceding year.

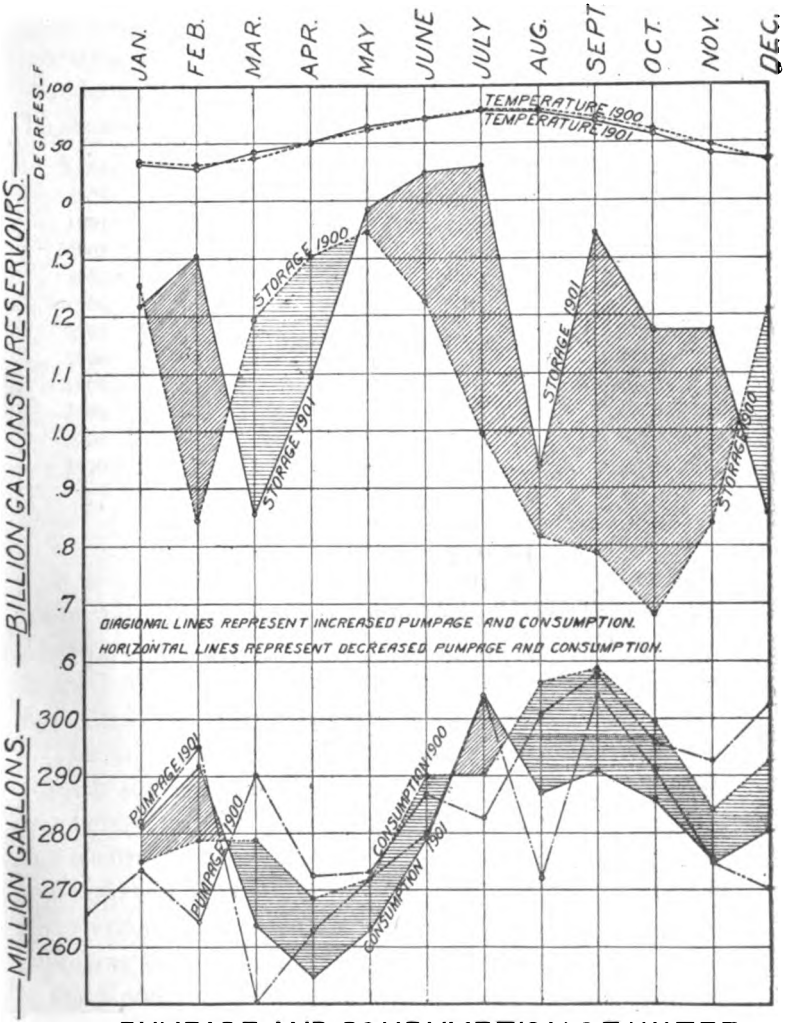
There was also a reduction, under similar conditions, of twenty-five (25) per cent. in the pumpage at the Roxborough works.

The introduction of the self-closing hopper closet fixtures, and the repairs made, during the past year, to a greater number of leaky fixtures, have also contributed largely to the decrease in the quantity of water consumed.

The average per capita consumption was 211.9 gallons per day, or ten (10) gallons less per capita than that of 1900.

There is considerable uncertainty in estimating the population of the City, but the rate of increase given by the U. S. Census is probably the most accurate data upon which to base such calculations. This rate of increase for the ten years from 1890 to 1900, was 23.5 per cent., which is an approximate rate of increase of 2.134 per cent. per year.

The following table shows the estimated population, based upon this percentage, for each of the succeeding ten years—1901-1910, both inclusive. It will further



—PUMPAGE AND CONSUMPTION OF WATER.—

—AVERAGE DAILY PER MONTH.—

—1900—1901.—

—PHILADELPHIA.—

serve as a standard for estimating the per capita consumption until the next census is taken, and through it more accurate data, than heretofore obtainable under different standards, for determining the per capita consumption, can be secured:

Year.	Annual Increase.	Population.
1900	United States Census	1,293,697
1901	27,607	1,321,304
1902	28,197	1,349,500
1903	28,798	1,378,298
1904	29,392	1,407,690
1905	30,040	1,437,730
1906	30,681	1,468,411
1907	31,336	1,499,747
1908	32,005	1,531,752
1909	32,688	1,564,440
1910	33,385	1,597,825

Clear Water.

It is gratifying to state that throughout the past year clear water was furnished to all consumers between the Delaware and the Schuylkill rivers, excepting during the latter half of December, when two freshets, the second immediately following the first, occurred.

The first freshet found us prepared, with full basins, to furnish subsided water while the river remained turbid; but before we had time to refill the reservoirs, the second one occurred, and while we were able at first to shut down some of the pumps, we were compelled before the water in the river became clear, to press into service all of those supplying the Queen Lane and the East Park system.

On March 11 there was a heavy rainfall, followed by an increase of from 13 inches, at midnight of March 10, to 82 inches, at noon of March 11, in the height of the water on Fairmount dam. On the latter date all the pumps at the Fairmount, Queen Lane and Roxborough works were shut down, and all at the Spring Garden station with the ex-

ception of No. 10, which we were obliged to keep in service to supply the experimental filter plant at that station. The pumpage, however, from this engine did not discolor the water in the basin to any noticeable extent. By noon of March 16 the water in the river became clear and all of the engines were started up again.

On August 11 and 25, freshets occurred and the pumps were again shut down for several days, as was also the case on December 15 and 29. On the latter date, as stated above, there was little water in the Queen Lane and the East Park basins, and pumpage was of necessity resumed before the river had become clear.

During the past year the water supplied to West Philadelphia has been practically in the same condition when it reached the consumers as that in the river, owing to lack of a storage basin of sufficient size to hold an ample supply of subsided water for distribution during periods of freshets in the river. Until the filter plants now under construction are finished, no relief, in this connection, can be given to West Philadelphia.

Distribution.

The distribution of water throughout the several water systems has been more satisfactory than for many years past, and there have been no serious complaints of a deficiency in the supply due to lack of pressure on the city mains.

The completion of the 48-inch main from Wentz Farm reservoir has increased the supply in the northeastern section of the city, and relieved that locality of all cause for complaint on this score.

The laying of the 48-inch main in Broad street from Arch to York streets is nearly finished, and when put into service it will materially increase the pressures between South and Vine streets and the Delaware and Schuylkill

rivers. The laying of other mains, for the relief of the Thirteenth and Fourteenth Wards, is under way, and these will be in service during the coming season. Changes in several of the water systems, by which the supply to these sections of the city will be further increased, can then be made.

Fairmount Station.

In my last report I had occasion to state that "owing to the drought of the past summer there was a decrease of 33.6 per cent. in the total pumpage of this station as compared with that of 1899." During the past year, however, the average water level in the river was much higher, and the pumpage at this station was correspondingly increased, reducing the deficiency of 33.6 per cent. to 17 per cent.

In view of the economy of operating the pumps by water power at this station, as compared with the cost of steam pumpage at the other stations, it is highly desirable to continue these works in service to the fullest extent possible. All the pumps are in fairly good repair, but it is impossible to keep turbine wheels Nos. 7, 8 and 9, located in the old house, in a presentable condition as long as the leaky roof over them remains in its present deplorable need of repair.

I therefore earnestly recommend that sufficient means be provided to make these repairs, also the important repairs needed to the Fairmount dam, upon the safety of which 80 per cent. of the city's water supply depends.

Spring Garden Station.

Owing to the frequent disabling of engines at the Queen Lane pumping station, it became necessary to make up the deficiency resulting therefrom by extra pumpage at the Spring Garden station. This additional work at the latter station prevented the making of many important, as well as minor, repairs to the machinery. Whenever an oppor-

tunity presented itself to shut down an engine for the purpose, such minor repairs as were possible were effected. In many respects, however, the machinery may be said to be in a better condition than it was a year ago.

Belmont Station.

In my last report I referred to the unfinished condition of the new engine house at the Belmont station.

This work has since been completed. New sidewalks have been laid, surplus materials have been cleared from the grounds, and the new building, with its surroundings, presents a very attractive appearance.

The base of the engine house is of quarry-faced Hummelstown brownstone, four courses high, above which is an 8-inch belt course of cut stone.

The walls are of dark red brick, and the cornice, arches over windows and doors, main doorway, imposts and bases of pilasters, are of terra cotta.

The roof of the engine house and the ventilator are covered with 10- by 15-inch terra cotta Conosera roll tiles.

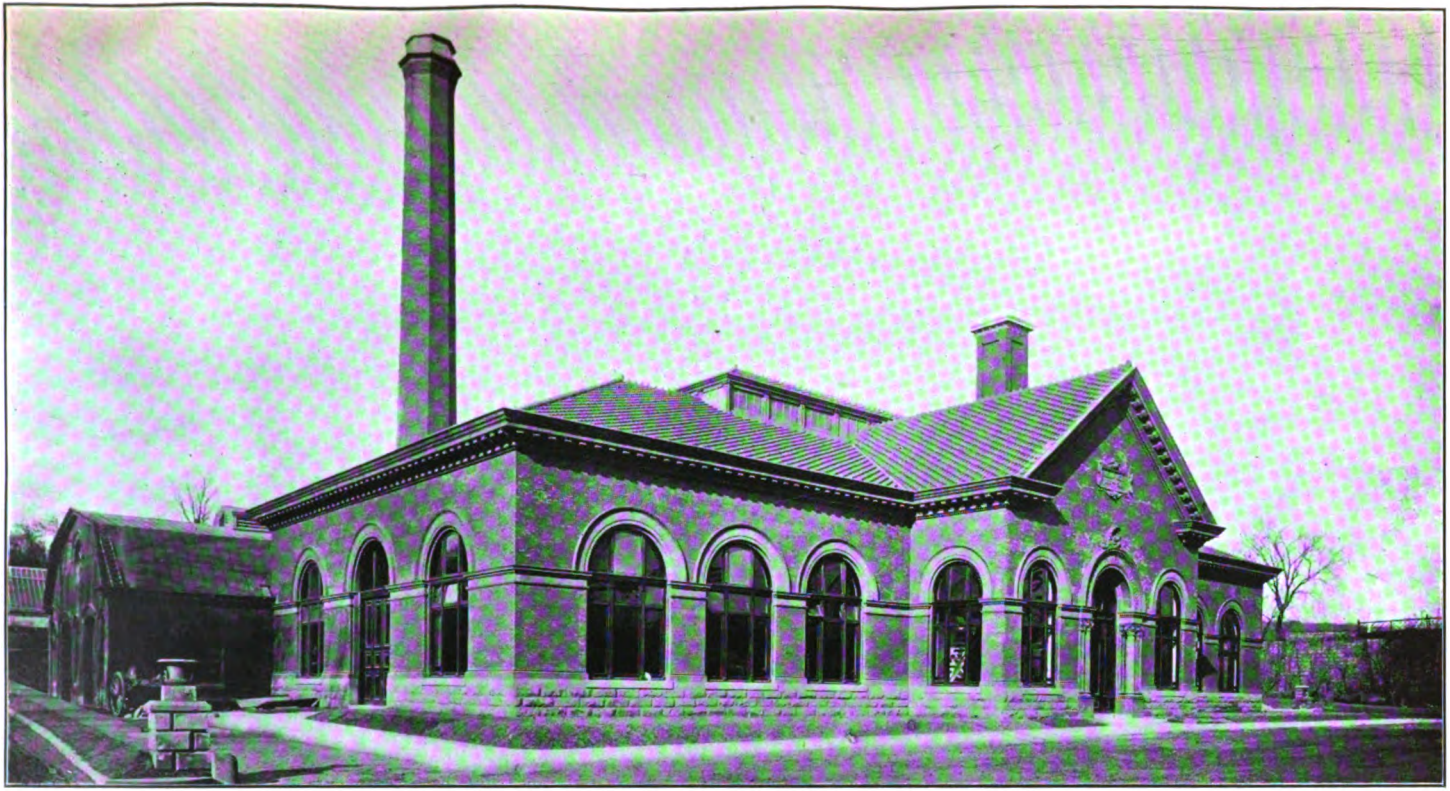
The interior is finished with a dark brown enameled brick dado six feet high, above which the walls are of white enameled brick.

The roof trusses and ventilator framing are of steel, and all the exposed metal work is painted white.

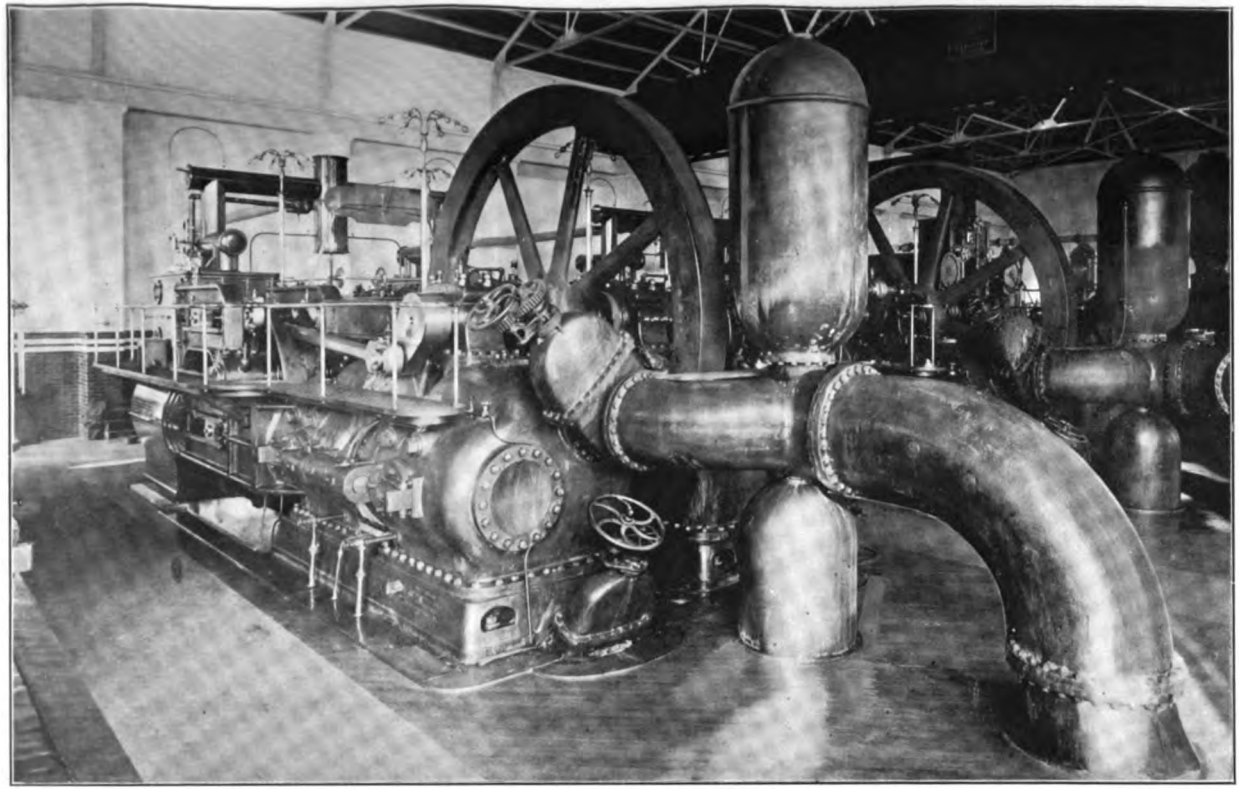
The engine room, 166.8 feet long by 66.5 feet wide, is traversed by a fifteen-ton electric traveling crane, built by William Sellers & Company.

Provision has been made for electric lighting by two New York Safety Company's electric engines and generators.

The bright, clean appearance of this engine room, with its abundance of light, oiled floor, seven large pumping engines and two electric generators, presents a particularly attractive appearance.



NEW BELMONT PUMPING STATION.



NEW HOLLY HORIZONTAL COMPOUND HIGH DUTY PUMP, BELMONT.

The work of erecting the three new 10-million gallon pumps (Nos. 5, 6 and 7) by the Holly Manufacturing Company, has been completed.

No. 5 engine was started on July 6, and Nos. 6 and 7 within a few days thereafter. Later, each engine was subjected to a 72-hour endurance test, during which time the engines pumped 8 million gallons per 24 hours, and the head on the pumps was increased about 40 per cent. above the normal pressure. Under these conditions the engines worked smoothly, without heating or injury to any of the moving parts.

From November 22 to 26 all three of the pumps were subjected to a B. T. U. test, with the following results.

Duty.

Engine.	In foot pounds per heat unit.	Percentage of duty in excess of contract requirements.
No. 5	123.95	3
No. 6	126.41	5
No. 7	125.73	5

A full statement of all data relative to these tests will be found in report of Mr. John E. Codman (Appendix E), who was the expert representative of this Bureau during the tests.

A particularly gratifying feature of the new pumps is their economy in the consumption of coal.

The total amount of coal consumed at these works in 1900 was 34,474 tons, as compared with 28,604 tons consumed in 1901, showing a saving of 6,924 tons, which, at the contract price for coal furnished to this station, represents an actual saving of $17,844.80.

As a matter of fact, however, the new pumps have been in operation only a part of the year, during which time the saving, as compared with the corresponding period of 1900, was 49 per cent., which, for the entire year, at contract prices, would amount to $58,521.12.

Since the new pumps were put into operation, engines Nos. 1 and 2 have been entirely out of service and are undergoing repairs.

Nos. 3 and 4 pumps are worked only when it becomes necessary to supplement the pumpage of engines Nos. 5, 6 and 7.

As soon as an opportunity presents, it is proposed to make extensive alterations and repairs to No. 4 pump. These will greatly add to its efficiency.

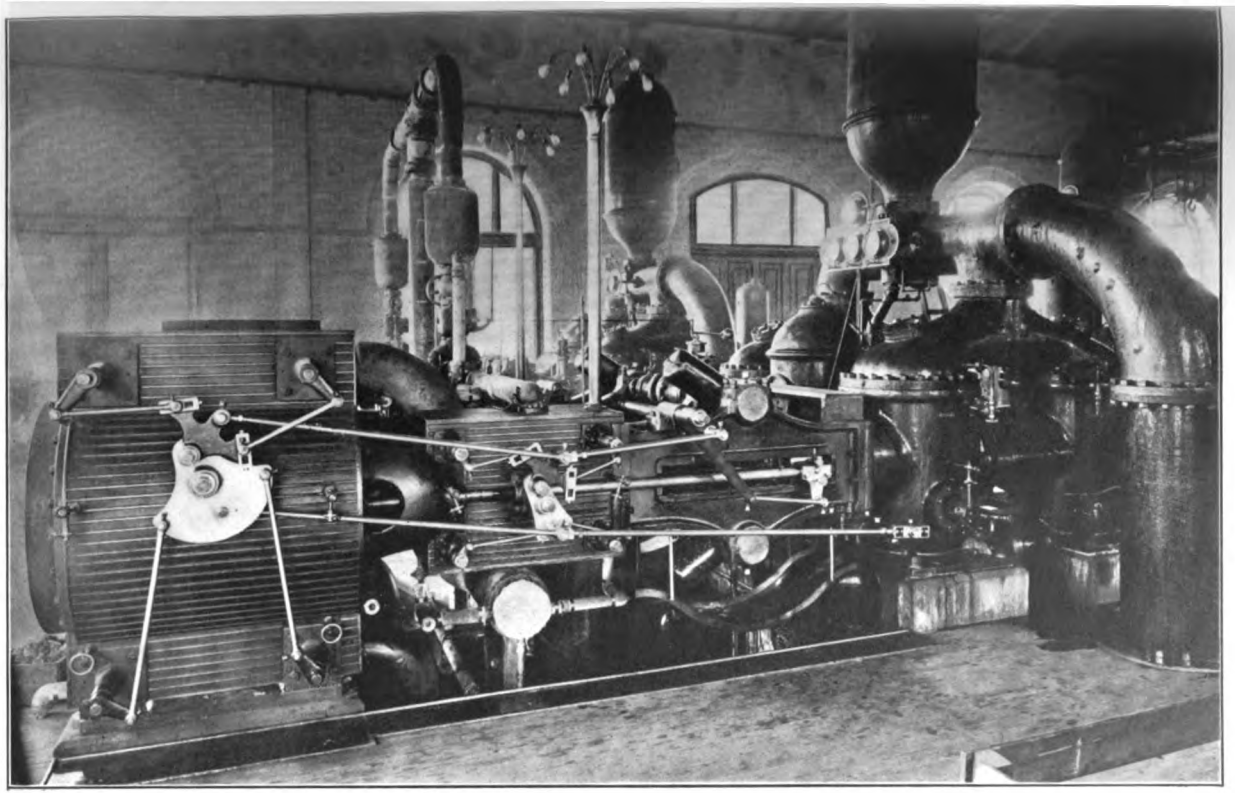
Queen Lane Station.

The chief trouble experienced at these works has been the breaking of pump chambers on all the engines, no less than five of these having broken beyond repair. A number have been replaced with new castings, and at present No. 2 pump is out of service, awaiting a new intermediate chamber.

It is difficult to determine the cause of these accidents, as the castings are made extremely heavy for the work to be performed. It is possible, however, that a change recently made in the design of the castings will remove at least one cause of their failure. Another change consists in the construction of suitable drains to keep the water from between the base of the pump chamber and the masonry foundations. The latter have been wearing away through the action of the water drawn between the pump chamber and the foundations with each revolution of the pump.

The pumpage at these works increased 6 per cent. during the past year, and there was an increase of 3,578 tons in the coal consumption, which amounted, at contract prices, to $11,807.40.

The cost of hauling coal at this station is still a heavy expense, reaching, during 1901, the sum of $9,776.50. The total amount expended for this purpose since 1896 was $51,444.96.



NEW WORTHINGTON HORIZONTAL COMPOUND DUPLEX HIGH DUTY PUMP, ROXBOROUGH.

Roxborough Station.

The four new 5,000,000 gallon engines erected by the Worthington Company at these works have been in service, whenever required, during the entire year.

These engines were subjected to an endurance test lasting seventy-two (72) hours, during which time they were required to pump 3,000,000 gallons each 24 hours under a pressure of 225 pounds to the square inch, or about 35 per cent. in excess of the normal head.

The performance of the engines during this test was entirely satisfactory.

Between September 12 and 24, all four of the engines were subjected to a duty test of foot pounds of work performed per heat unit, with the following results:

Duty.

Engine.	In foot pounds per heat unit.	Percentage of duty in excess of contract requirements.
No. 4	131.81	10
No. 5	129.26	8
No. 6	131.26	9
No. 7	132.05	11

For full statement of all data pertaining to these tests, see Appendix E.

These new pumps have, like those at Belmont, proved to be good fuel savers, the consumption of coal at the Roxborough works having fallen off 9,666 tons, or 34 per cent. less than that of last year. The amount saved in coal, at contract prices, was $29,481.30.

The old Nos. 2 and 3 Worthington pumps have been thoroughly repaired and are in a very satisfactory condition; also, the boilers and steam piping at these works.

The old engine house has been repainted, and considerable grading has been done to the grounds. The latter work, however, cannot be carried on with any degree of

satisfaction until after the completion of the new coal shed, plans and specifications for which have been prepared.

Frankford Station.

In my report for 1900 I made mention of the fact that a contract had been let to the Southwark Foundry and Machine Company to remove the No. 1 Southwark pump from the Roxborough station and to reset it on foundations, constructed by employees of this Bureau, at the Frankford works.

These foundations were finished and ready to receive the engines early in the year, and the re-erection of the engine thereon was begun shortly thereafter. The latter work was completed and the engine started on November 25, since which time it has been in constant service. It is now known as the No. 4 Frankford engine.

During the re-erection of No. 4 engine, the new 48-inch supply main from Wentz Farm reservoir was completed and put into service, thus materially increasing the quantity of water supplied from these works.

The space now occupied by No. 4 pump was formerly used for a storeroom, for carpenter work, and for the making of such repairs as are constantly required at each of our large pumping stations.

Room for the storage of materials, etc., was therefore provided in a new building constructed for these purposes.

A new room, in which to place the donkey pumps, was also constructed in the boiler house, and many other, but less important, changes and alterations were made, all of which contribute greatly to the improvements made, during the past year, at this station.

High-Service Station.

The Chestnut Hill and Mt. Airy high-service pumping stations remain in about the same condition as stated in my report of last year.

Both these stations are practically out of service, and at present there is no necessity for their continuance except in case of accident to the mains which now supply Germantown, Mt. Airy and Chestnut Hill from the Roxborough high-service station and the Upper Roxborough reservoir.

The new Worthington high-duty engines erected at the Roxborough and the Belmont high-service stations during the latter part of 1900 have been in almost constant service, and have proven to be most excellent and economical pumps.

The engines were each subjected to an endurance test lasting 72 hours, during which time they were required to deliver 3,000,000 gallons per 24 hours against a static head, on the pump chamber, of 100 pounds per square inch, or 56 and 80 per cent, respectively, in excess of the normal pressure.

The behavior of these pumps during the tests was perfectly satisfactory.

In June and July, 1901, the pumps were subjected to a duty test, during which time the following results were obtained:

Duty.

	In foot pounds per 1,000 pounds of steam.	Percentage in excess of contract requirements.
Roxborough High Service		
Engine No. 2	**121,200,000**	**1.0**
Belmont High Service		
Engine No. 2	**124,285,000**	**3.5**

For a full statement of all data relative to these tests, see Appendix E.

The old No. 1 pumps at both the Belmont and the Roxborough high-service stations have been thoroughly repaired, and these stations are well equipped for the work required of them.

The new high-service station at Wentz Farm has been in service throughout the past year.

The operation of these works has not only proved to be of considerable benefit to the residents of Lawndale and Fox Chase, but the fact that City water is now available for domestic and fire purposes in that section, has created a very strong incentive to building enterprises, which have greatly increased, during the past year, throughout that district.

No. 1 Holly pump was subjected to endurance and duty tests similar to those of the Worthington pumps at the Roxborough and Belmont high-service stations. (For full particulars, see Appendix E.)

The d'Auria high-duty 4,000,000 gallon horizontal duplex pump has been erected at the Wentz Farm station by employees of this Bureau, and it is now ready for service.

This pump is of new design, and as soon as opportunity permits it will be practically tested—both by actual service as well as by duty tests—to determine its economy, and upon completion of these tests a full report thereon will be submitted.

New Purveyor's District.

Provision was made by ordinance of Councils for the creation of an additional Purveyor's District, to be known as the Seventh District, and on April 1, 1901, Mr. Michael Young, formerly general foreman of the Second District, was appointed Purveyor of this new district.

The Seventh District covers the Twenty-fourth, Twenty-seventh, Thirty-fourth and Fortieth Wards, formerly part of the Second District, and the latter has been increased by the addition of the Eleventh, Twelfth, Thirteenth, Fourteenth, Sixteenth and Seventeenth Wards, taken from the Third and Fourth Districts.

A new district yard, located on the south side of Parkside avenue, west of Belmont avenue, has been provided

for the storage of materials, etc. Plans for the erection therein of an office, stable, wagon shed and repair shop, and I earnestly recommend their immediate construction so as to provide for the necessary housing and proper means to transact the business of this district.

Water Rates and Charges.

An ordinance "Regulating the Schedule and Meter Charges for Water, and Establishing a Minimum Rate Proportionate to the Size of the Connection to the Main," was passed by Councils, and approved July 27, 1901.

This ordinance renews the majority of the old rates and charges, regulates the amount of rents for appliances heretofore unprovided for, and legalizes, in the future, certain rules and practices of the Bureau made necessary by the introduction of appliances for which no legislation had previously been enacted.

The new ordinance also authorizes a minimum charge for metered, as well as for unmetered, connections, thus removing all future question as to the legality of these charges, and extends the right (heretofore denied) to property owners to place meters, for domestic purposes, on their private supply pipes.

Meters.

Owing to lack of sufficient appropriation for the purchase of meters, many applicants for these could not be accommodated. The inability of the Bureau to furnish meters proves very frequently a hardship, especially to manufacturers, for the latter are sometimes obliged to have, in reserve, on their premises, extra boilers, engines and other appliances, and are compelled to pay thereon full schedule rates, whether water is used through these fixtures or not.

I would therefore urge an increase of appropriation sufficient to enable us to meet these demands.

The total number of meters in use December 31, 1901, was 1,435, an increase of 167 over the preceding year.

Prompt attention has been given to the repairing of meters and to all complaints in connection therewith, and general improvements have been effected throughout this branch of the service.

Respectfully submitted,

F. L. HAND,
Chief of Bureau.

Comparison of Pumpage for the Delaware and Schuylkill Rivers for 1900 and 1901.

	GALLONS.		GALLONS.	
	1900.	1901.	Increase.	Decrease.
Annual pumpage:				
From rivers	104,704,533,711	101,836,624,094	.....	2,867,909,617
High service	2,118,042,344	1,968,833,130	.....	149,209,214
Total	106,822,576,055	103,805,457,224	.....	3,017,118,831
Maximum daily pumpage:				
From rivers	348,005,088	338,248,638	.....	9,756,450
High service	5,290,350	5,542,050	251,700	
Total	353,295,438	343,790,688	.....	9,504,750
Average Daily Pumpage:				
From rivers	286,861,7 6	279,004,450	.....	7,857,286
High service	5,802,855	5,394,063	.....	408,792
Total	292,664,591	284,398,513	.....	8,266,078
Average Daily Pumpage:				
From rivers, per capita	221.7	211.1	.....	10.6

Volume and Cost of Pumpage for the Years 1891 to 1901, 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.
1891.....	55,665,648,000	93,490,106,725	2.99	140	1,071,000
1892.....	59,787,584,178	102,443,373,631	2.68	143	†1,142,650
1893.....	65,352,736,978	110,590,708,479	3.22	150	1,190,493
1894.....	72,073,724,238	121,199,588,387	3.48	159	1,238,112
1895.....	78,775,849,104	132,040,954,195	3.69	162	1,329,957
1896.....	87,693,642,529	161,776,711,713	3.43	172	1,367,815
1897.....	95,667,466,871	187,371,927,277	3.16	185	1,385,734
1898.....	102,241,835,372	210,828,629,625	2.97	196	1,400,000
1899.....	107,991,371,604	231,813,686,728	2.90	199	1,425,843
1900.....	106,822,576,055	218,119,532,621	3.71	221	*1,293,697
1901.....	103,805,457,224	210,456,847,513	4.14	211	1,321,304

* United States Census. † City Census.
‡ Including repumpage or high service.

Cost of Raising 1,000,000 Gallons 100 feet during 1900 and 1901.

Pumping Stations.	1900.	1901.	Increase.	Decrease.
Fairmount	$1 79	$1 90	$0 11	
Spring Garden	3 36	3 95	59	
Belmont	5 03	5 60	57	
Queen Lane	2 75	3 10	35	
Roxborough	4 99	5 18	19	
Frankford	3 76	4 73	97	
Average	$3 58	$3 99	$0 41	
High Service Stations:				
Belmont	$32 51	$22 36	.....	$10 15
Roxborough	8 38	7 86	.....	52
Mt. Airy	18 88	54 28	$35 40	
Chestnut Hill	82 33	309 02	226 69	
Frankford	23 27	84 13	60 86	
Average	$14 94	$17 86	$2 92	
Total average	$3 71	$4 14	$0 43	

Comparison of the Nominal, Maximum, Minimum and Average Daily Pumpage for 1900 and 1901.

Pumping Stations.	Nominal.		Maximum.		Minimum.		Average.	
	1900.	1901.	1900.	1901.	1900.	1901.	1900.	1901.
Fairmount	33,290,000	33,290,000	39,567,619	37,332,037	695,649	2,094,300	15,689,009	19,557,684
Spring Garden	170,000,000	170,000,000	168,760,140	158,975,620	32,796,880	14,952,980	136,556,360	125,070,244
Belmont	38,000,000	68,000,000	41,168,400	42,310,500	25,323,956	16,140,820	32,586,051	30,928,128
Queen Lane	80,000,000	80,000,000	82,248,350	89,025,750	7,232,000	9,189,650	62,855,142	66,567,209
Roxborough	51,000,000	32,500,000	25,118,525	25,947,880	1,961,300	1,959,780	20,071,096	15,162,146
Totals from Schuylkill	372,290,000	383,790,000	356,863,034	353,591,787	68,009,785	44,337,530	267,757,658	257,285,411
Increase	.....	11,500,000						
Decrease	.....	.....	.....	3,271,247	.....	23,672,255	.....	10,472,247
Frankford	42,000,000	57,000,000	30,270,430	34,216,630	9,911,225	8,083,655	19,104,078	21,719,039
Totals from Delaware	42,000,000	57,000,000	30,270,430	34,216,630	9,911,225	8,083,655	19,104,078	21,719,039
Increase	.....	15,000,000	.....	3,946,200	.....	.....	.....	2,614,961
Decrease	.....	.....	.....	.....	.....	1,827,570	.....	.....
Totals from Delaware and Schuylkill	414,290,000	440,790,000	387,133,464	387,808,417	77,921,010	52,421,185	286,861,736	279,004,450
Increase	.....	26,500,000	.....	674,952	.....	.....	.....	.....
Decrease	.....	.....	.....	.....	.....	25,499,825	.....	7,857,286

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

High Service stations.	Nominal.		Maximum.		Minimum.		Average.	
	1900.	1901.	1900.	1901.	1900.	1901.	1900.	1901.
Belmont	7,000,000	7,000,000	1,374,545	7,762,858	480,600	564,705	704,987	1,132,696
Roxborough*	10,000,000	10,000,000	4,598,460	4,932,100	1,132,080	1,169,830	3,716,867	3,766,452
Mt. Airy	3,000,000	3,000,000	1,485,000	2,231,250	1,091,250	90,000	1,126,663	324,323
Chestnut Hill	750,000	750,000	501,840	735,480	78,720	73,600	89,056	28,302
Frankford	3,000,000	7,000,000	3,362,614	2,034,408	74,655	56,880	165,282	142,290
Total High Service	23,750,000	27,750,000	11,232,459	17,696,096	2,857,305	1,955,015	5,802,855	5,394,063
Total daily	438,040,000	468,540,000	398,365,923	405,504,513	80,778,315	51,376,200	292,664,591	284,398,513
Increase		30,500,000		7,138,590				
Decrease						26,402,115		8,266,078

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.

F. Report of Consulting Engineer in charge of the Improvement, Filtration and Extension of the Philadelphia Water Supply.

APPENDIX A

REPORT OF CHIEF CLERK

Philadelphia, January 20, 1902.

MR. FRANK L. HAND,
Chief of Bureau.

DEAR SIR:—I have the honor to transmit, herewith, a detailed statement of the expenditures of the Bureau, an itemized list of miscellaneous receipts and a table of the revenues derived from the operations of the Bureau during the year 1901.

Yours respectfully,

J. T. HICKMAN,
Chief Clerk.

List of Miscellaneous Receipts for the year 1901.

Jan.	2	Phila. & Reading Ry. Co.....	Removing fire hydrant.....	$6 04
	16	Baldwin Locomotive Works..	Repairing 4-inch stop.....	5 50
	19	Union Traction Co	Removing fire hydrant.....	45 62
	24	Southwark F. & M. Co.....	Repairing 6-inch stop.....	29 27
Feb.	5	J. H. Loucheim	Shut off.....	44
Mar.	18	Wm. Sellers & Co.....	Renewing 3-inch stop.....	18 60
	26	German Democrat Building..	Cutting off 6-inch pipe.....	13 38
	29	Burnham, Williams & Co....	Moving fire hydrant.....	34 45
April	10	Young Maen. Association....	Drawing ferrule.....	9 83
	9	Bureau of Water.....	Overdrawn warrant, No. 3287	2 23
	9	Bureau of Water-.....	Overdrawn warrant, No. 3288	1 88
	9	Bureau of Water.....	Overdrawn warrant, No. 3289	5 91
	9	Bureau of Water.....	Overdrawn warrant, No. 3304	13 00
	9	Bureau of Water.....	Overdrawn warrant, No. 3305	552 95
	9	Bureau of Water.....	Overdrawn warrant, No. 3307	3 50
	9	Bureau of Water.....	Overdrawn warrant, No. 3310	21 37
	9	Bureau of Water.....	Overdrawn warrant, No. 267.	1 75
	10	David Peoples.....	Removing No. 1 fire hydrant	5 93
	15	Alcatraz Paving Co.....	Repairing fire hydrant	4 72
	19	David France.....	Repairing 6-inch main.....	11 06
	20	Union Traction Co.....	Moving 8-inch stop.....	23 99
	20	Union Traction Co.....	Repairing 6-inch connection	31 88
	22	David France.....	Drawing ½-inch ferrule.....	2 38
May	20	Union Traction Co.....	Moving 12-inch stop	46 03
	21	J. R. Neison.....	Scrap brass and turning.....	1,144 03
	22	Keystone Telephone Co.....	Raising 6-inch pipe.....	20 69
June	15	Keystone Telephone Co.....	Raising 6-in. fire connection.	24 24
	15	Keystone Telephone Co.....	Raising No. 2 fire hydrant...	16 34
	15	Girard Iron and Metal Co....	Old material.....	1,706 22
	19	J. H. Loucheim	Moving 8-inch pipe.....	27 35
	28	Henderson & Co., Ltd.....	Removing 30-in. & 36 in. pipe	5 25
July	5	Pennsylvania R. R. Co.....	Putting on 4-inch stop.....	37 90
	5	John J. Mundy.....	Taking out 6-inch pipe.....	9 87
	5	John J. Mundy.....	Replacing 200 ft. of 6-in. pipe.	67 16
	5	John J. Mundy.....	Replacing 188 ft. of 6-in. pipe.	39 97
	5	John J. Mundy.....	Replacing 155 ft. of 6-in. pipe.	61 72

List of Miscellaneous Receipts for the Year 1901.

July	15	Keystone Telephone Co.....	Removing No .3 fire hydrant.	$38 81
	22	Howard Ruch.....	Repairing 6-inch main.....	10 77
	31	Baltimore & Ohio R. R. Co..	Renewing 4-inch stop	28 01
Aug.	10	Philadelphia Bourse.....	Renewing stop-box.....	4 98
	16	Baldwin Locomotive Works	Repairing 4-inch valve.....	1 66
	16	Baldwin Locomotive Works	Packing 4-inch stop	2 14
	17	Keystone Telephone Co.....	Repairing 6-inch main.....	25 27
	17	Keystone Telephone Co.....	Lowering 6-in. f. hydrant con.	16 62
	17	Keystone Telephone Co.....	Lowering 10 feet of 6-in. pipe	23 37
	20	Pennsylvania R. R. Co.....	Renewing No. 2 fire hydrant.	39 82
	20	Union Traction Co.....	Renewing stop boxes.....	15 00
	20	Bergner & Engel Brew'g Co.	Renewing No. 2 fire hydrant..	38 00
	30	Philadelphia Stock Yard Co.	Repairing 4-inch stop.....	3 02
Sept.	9	Henderson & Co.....	Moving fire hydrant.....	19 12
	10	John F. Lodze.....	Renewing stop box..	4 75
	14	Keystone Telephone Co.....	Relaying 6-inch pipe.....	57 11
	14	Keystone Telephone Co.....	Relaying 6-inch pipe.....	44 01
	24	Ryan & Kelly.....	Laying temporary service pipe	8 50
Oct.	7	James Dolphin, Jr.....	Repairing 4-inch main.....	25 26
	16	Burnham, Williams & Co....	Repairing 4-inch main.....	10 12
	16	Burnham, Williams & Co....	Leak on 1½-inch water pipe..	3 00
	21	Richard Benner.....	Putting on new ½-in, ferrule.	2 12
	21	Union Traction Co.....	Moving 6-inch stop.....	25 22
	21	Union Traction Co.....	Moving 8-inch stop.....	28 41
Nov.	11	Pennsylvania R. R. Co... ..	Putting on 6-in. supply con..	84 71
	21	Union Traction Co.....	Moving 6-inch stop.....	39 03
	27	Keystone Telephone Co.....	Repairing 6-inch main.....	15 69
	29	Phila. & Reading R. R. Co..	Renewing 4-inch stop.....	31 68
Dec.	5	Howard Ruch.....	Repairing 6-in. main.....	9 17
	6	Joseph Perna	Raising 6-inch pipe	$14 93
	12	Philadelphia Ice Mfg. Co.....	Repairing 4-inch stop.....	5 73
	14	Germantown Spinning Co....	Removing private fire connection	29 57
	14	Germantown Spinning Co....	Removing private supply connection.....	13 39
	19	Union Traction Co	Removing 8-inch stop.....	25 73
	27	Union Traction Co.....	Renewing fire hydrant.....	38 32

List of Miscellaneous Receipts for the Year 1901.

Dec.	31	Ryan & Kelly	Laying 12-inch main	90 50
	31	Ryan & Kelly	Lowering 6-inch main	26 50
	31	Ryan & Kelly	Putting in service pipe	2 50
	31	Ryan & Kelly	Cutting out 6-inch main	4 50
	31	Ryan & Kelly	Laying 6-inch main	64 50
	31	Ryan & Kelly	Putting on attachments	6 00
	31	Ryan & Kelly	Removing 12-inch pipe.	15 87
	31	Ryan & Kelly	Connecting and turning on water	22 50
	31	Ryan & Kelly	Replacing 12-inch main	257 98
				$5,326 34

Detailed Expenditures of the Bureau for 1901.

General Appropriation.	Amount appropr'd.	Amount expended.	Amount merging.	Amount not merg'g.
An Ordinance to make an appropriation to the Bureau of Water, approved Dec. 31, 1900. $1,192,733 00				
Balance from books of 1900 ..... 5,223,955 14				
Additional appropriations and transfers.. 9,361,261 34				
$15,777,949 48				
Diminished by transfer. 17,748 84				
Net appropriation.....	15,760,200 64			
Item 1. Salaries..... $360,583 00				
Diminished by transfer. 16,000 00				
Net appropriation to item.....	$344,583 00			
For salary of 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	720 00		
Draughtsmen	7,200 00	6,341 08		
Genl. superintendent	3,500 00	3,500 00		
Asst. to genl. superintendent.....	900 00	750 00		
Clerk to genl. superintendent	2,000 00	2,000 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	2,134 49		
Assistant clerks.....	3,650 00	3,650 00		
Chief inspector.....	1,200 00	1,200 00		
Inspectors.....	19,000 00	18,478 73		
Permit clerks.....	2,300 00	2,300 00		
Purveyors	10,680 00	10,310 01		
Clerks to Purveyors..	5,600 00	5,393 35		
Asst. clerks to purveyors	5,250 00	4,484 22		
Hydrant inspectors..	7,050 00	6,966 16		
General foremen.....	7,573 00	5,977 71		
Foremen of repairs..	7,020 00	6,489 09		
Supt. of shop.....	1,500 00	1,500 00		
Clerk to supt. of shop.	900 00	900 00		
Watchmen, office and yards	6,075 00	5,945 00		
Storekeepers.....	1,400 00	1,400 00		
Foreman machinist..	1,500 00	1,500 00		
Foreman bricklayer..	1,100 00	1,025 73		
Foreman carpenter...	1,000 00	1,000 00		
Foreman stone mason.....	900 00	852 00		
Foreman painter.....	900 00	900 00		
Foreman rigger	900 00	900 00		
Foreman laborer	840 00	840 00		
Janitor main office...	720 00	720 00		
Lineman.....	1,000 00	1,000 00		
Telephone operators..	1,220 00	1,220 00		
Electrician.....	1,200 00	1,200 00		
General storekeeper..	1,000 00	1,000 00		
Yard keeper (4th district)	915 00	915 00		

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.		Amount appropri'd	Amount expended.	Amount merging.	Amount not merg'g
Item 1—Continued.					
SALARIES AT PUMPING STATIONS.					
Fairmount		$12,950 00	12,795 78		
Spring Garden		82,560 00	78,811 61		
Belmont		28,140 00	26,643 06		
Belmont High Service		6,350 00	6,124 50		
Queen Lane		39,720 00	37,269 54		
Roxborough		27,280 00	24,681 95		
Roxborough High Service		7,700 00	7,669 30		
Mt. Airy		4,510 00	4,028 18		
Chestnut Hill		2,350 00	2,350 00		
Frankford		15,060 00	14,188 53		
Frankford High Service		7,400 00	7,354 30		
Helper		750 00			
Total		.....	$342,331 12	$2,251 88	
Item 2. For purchase of coal		$400,000 00			
COAL FOR OFFICES AND SHOP.					
1 ton bituminous	$3 75				
3.2 tons bituminous, $4.50	13 95				
6 tons bituminous, at $4.00	24 00				
17 tons bitumin's, at $3.70	62 90				
40 tons bitumin's, at $3.47	138 80				
3 tons stove, at $5.94	17 82				
9.15 tons stove, at $5.06	49 46				
8 tons stove, at $6.25	50 00				
10 tons stove, at 5.37	53 70				
10 tons nut, at $5.47	54 70				
17 tons stove, at $5.75	97 75				
31 tons stove, at $5.67	175 77				
325.15 tons pea at $3.40	1,106 60	.....	$1,849 20		
86 tons egg, Fairmount, at $5.21	$448 06				
36.04 tons buck., Belmont, at $2.28	82 54				
132.03 tons pea, Chestnut Hill, at $3.30	436 10				
241.07 tons pea, Frankford High Service, at $3.50	844 73				
425.16 tons buck., Mt. Airy, at $2.60	1,114 88				
8,473.17 tons buck., Fkd., at $2.36	19,998 28				
16,769.08 tons pea, Roxborough, at $3.05	51,146 69				
28,356.12 tons pea, Belmont, at $3.04	86,202 54				
34,106.06 tons pea, Queen Lane, at $3.30	112,550 82				
54,487.13 tons buck., Spring Garden, at $2.30	125,321 61	.....	$398,146 25		
Rehandling coal		.....	1 00		
Total		.....	$399,996 45	$3 55	

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.		Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 3. For the purchase of oil, lubricants, paints, brushes, wood and coke, and for the hauling of coal	$10,000 00				
Increased by additional appropriation and transfer	6,000 00				
Net appropriation to item		$16,000 00			
Alcohol			$88 06		
Coke			319 65		
Grease, lubricating, 2,325 lbs., at 8½c	$197 63				
Grease, lubricating, 15,984 lbs., at 10c	1,598 40				
			1,796 03		
Grease cups, 12, at 75c.	$9 00				
Grease cups, 24, at $2.50	60 00				
			69 00		
Hauling coal, Roxborough to Roxborough High Service Station, 1,482 tons, at 33¾c			500 17		
OIL.					
106 gals. headlight, at 11c	$11 66				
265 gals. gasoline, at 9¾c	25 84				
5,619 gals. headlight, at 8¾c	491 61				
			529 11		
8 gals. castor, at $1	$8 00				
246½ gals. black, at 7½c	18 65				
50 gals. lard, at 45c	22 50				
115 gals. lard, at 55c	63 25				
8,749¼ gals. engine, at 30c	2,624 85				
12,936½ gals. cylinder, at 45c	5,821 47				
			8,558 72		
Paints			3,479 88		
Tallow, 738 lbs., at 6c			44 28		
Wood, 9 cords, at $9			81 00		
Total			$15,465 90	$534 10	
Item 4. 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.	$125,000 00				
Increased by additional appropr't'n and trans.	53,986 34				
Net appropriation to item		$178,986 34			
Transportation			$3,830 93		

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.		Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Isem 4—Continued.					
Wages:					
Bricklayers	$10,989 60				
Carpenters	8,380 50				
Helpers	8,275 00				
Horses, carts and drivers	11,067 25				
Laborers	94,309 51				
Machinists	26,017 14				
Painters	5,305 50				
Stone masons	7,085 75				
		.....	$171,430 25		
Total		.....	$175,261 18	$3,725 16	
Item 5. For wages of mechanics, drillers, caulkers, laborers and other workmen connected with the repairs to and improvement of the distribution, the laying of service mains, the transportation of workmen incident thereto and the traveling expenses of pipe inspectors	$75,000 00				
Increased by additional appropr'n and trans.	174,000 00				
Net appropriation to item		$249,000 00			
Traveling expenses (pipe inspectors)		.....	$540 05		
Transportation		.....	3,176 06		
Wages:					
Improvement	$22,658 68				
First District	18,250 93				
Second District	21,571 13				
Third District	55,906 19				
Fourth District	47,226 25				
Fifth District	20,296 42				
Sixth District	29,023 78				
Seventh District	29,429 36				
		.....	244,362 74		
Total		.....	$248,078 85	$921 15	
Item 6. For wages of mechanics, helpers, laborers and other workmen at the City construction and repair shop	$22,000 00				
Increased by additional appropr'n and transfer	9,500 00				
Net appropriation to Item		$31,500 00			
Wages		.....	$31,024 27	$475 73	
Item 7. For the purchase of iron, water pipe, special pipe castings and pig lead	$50,000 00				
Increased by additional appropriation	40,000 00				
Net appropriation to Item		90,000 00			

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.			Amount appropri'd	Amount expended.	Amount merging.	Amount not merg'g
Item 7—Continued.						
Iron water pipes and specials.						
5,030 6-in., 1,823,371 lbs., at 1.0826c		$19,740 30				
2,000 8-in., 963,388 lbs., at 1.0826c		10,429 64				
2,000 10-in., 1,352,422 lbs., at 1.05c		14,200 43				
1,130 12-in., 1,038,316 lbs., at 1.038c		10,777 96				
200 16-in., 272,201 lbs., at 1.038c		2,825 45				
6,479 lbs., specials, at 2¼c		145 78				
7,864 lbs., specials, at 2½c		196 60				
681,117 lbs., specials, at 2c		13,622 34				
523 hours machine work at 40c		209 20				
			.....	$72,147 70		
Pig Lead.						
Shop	1,588 lbs.,					
First district	30,260 "					
Second "	30,126 "					
Third "	40,245 "					
Fourth "	30,349 "					
Fifth "	30,013 "					
Sixth "	30,085 "					
Seventh "	30,060 "					
	222,717 "	at 4.49c	.....	9,999 98		
Total			.....	$82,147 68	$7,852 32	
Item 8. For wages of the hydrographic corps			$1,600 00	$1,596 00	$4 00	
Item 9. For the purchase of hardware, bolts and nuts		$6,000 00				
Increased by transfer		3,000 00				
Net appropriation to Item			9,000 00	8,998 50	1 50	
Item 10. For the purchase of iron, steel and malleable castings		$20,000 00				
Increased by additional appropriation		8,000 00				
Net appropriation to item			28,000 00			
Machine work		$311 04				
Steel forgings		357 64				
15,220 lbs. loam castings, at 3½c		532 70				
75,925 lbs. grate bar castings, at 1¾c		1,328 69				
102,716 lbs. frame and cover castings, at 1½c		1,540 76				
52,585 lbs. machinery castings, at 3¼c		1,741 56				
75,763 lbs. miscellaneous castings, at 2⅜c		1,799 37				

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.		Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 10—Continued.					
72,700 lbs. machinery castings, at 4¼c.....	$3,089 76				
265,761 lbs. stop box castings, at 1 $\frac{6}{10}$c.....	4,252 19				
567,084 lbs. fire hydrant, stop castings, at 2 $\frac{15}{100}$c.	12,419 14				
		.....	$27,372 85	$627 15	
Item 11. For the purchase of gum goods and packing.....	$10,000 00				
Increased by additional appropriation and transfer.....	9,000 00				
Net appropriation to item.....		$19,000 00			
Gum goods.....		.....	4,749 43		
Packing.....		.....	14,178 26		
Total.....		.....	$18,927 69	$72 31	
Item 12. For repairs to boilers.....	$20,000 00				
Increased by additional appropriation.....	7,500 00				
Net appropriation to item.....		$27,500 00			
City Shop.....	$38 25				
Belmont High Service.	51 41				
Frankford High Service	54 00				
Frankford.....	651 25				
East Park.....	816 85				
Roxborough.....	4,613 33				
Belmont.....	4,722 37				
Spring Garden.....	7,602 42				
Queen Lane.....	8,945 11				
		.....	$27,499 99	$0 01	
Item 13. For the purchase of chandlery...	$4,000 00				
Increased by additional appropriation	1,500 00				
Net appropriation to item.....		5,500 00	5,360 55	139 45	
Item 14. For the purchase of wr'ght iron pipe and fittings..	$3,000 00				
Increased by additional appropriation.....	3,000 00				
Net appropriatien to item.....		6,000 00	5,565 19	434 81	
Item 15. For the purchase of fire brieks and clay.....	$1,500 00				
Diminished by transfer..	250 00				
Net appropriation to item.....		1,250 00	562 35	687 65	
Item 16. For the purchase of brass fittings, cocks and valves for steam and water.....	$7,000 00				
Increased by additional appropriation.....	6,000 00				
Net appropriation to Item.....		13,000 00			

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.	Amount appropr'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 16—Continued.				
Brass fittings	.....	6,370 88		
5,000 ⅝-in. curb stops at 35c	.....	1,750 00		
CORPORATION COCKS.				
10,000 ½-in. at 31.93c $3,193 03				
900 ⅝-in. at 43.10c 387 91				
100 ¾-in. at 63c 63 00				
100 1-in. at 96c 96 00				
50 1¼-in. at $1.75 ..... 87 50				
50 1½-in. at $1.99 ..... 99 50				
150 2-in. at $2.88 ..... 432 00				
	.....	4,358 94		
Total	.....	$12,479 82	$520 18	
Item 17. For covering steam pipes and boilers	$1,000 00			
Belmont $79 80				
Frankford 398 83				
Roxborough 521 00				
	.....	$999 63	37	
Item 18. For the purchase of lumber $7,000 00				
Increased by additional appropriation 8,000 00				
Net appropriation to item	15,000 00	14,607 71	392 29	
Item 19. For the purchase of forage, $4,000 00				
Increased by additional appropriation 3,000 00				
Net appropriation to item	7,000 00	6,968 84	31 16	
Item 20. For hauling water pipe and machinery $5,000 00				
Increased by additional appropriation 3,000 00				
Net appropriation to item	8,000 00	7,969 56	30 44	
Item 21. For the purchase of cement $3,000 00				
Increased by additional appropriation 1,000 00				
Net appropriation to Item	4,000 00	3,999 58	42	
Item 22. For the purchase of iron and steel $1,500 00				
Increased by transfer 2,000 00				
Net appropriation to item	3,500 00	2,855 55	644 45	
Item 23. For the purchase of bricks, blocks, lime, sand, etc	5,000 00	4,559 66	440 34	

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 24. For the purchase of electric supplies..... $2,000 00				
Increased by additional appropriation..... 1,000 00				
Net appropriation to item.....	$3,000 00	$2,997 88	$2 12	
Item 25. For repairs to roofs, $1,500 00				
Increased by transfer..... 500 00				
Net appropriation to item.....	2,000 00	1,996 75	3 25	
Item 26. For the purchase of granite curb and coping stone.....	1,000 00	999 45	55	
Item 27. For the purchase of brass castings, etc..... $5,000 00				
Increased by additional appropriation..... 3,000 00				
Net appropriation to item.....	8,000 00			
568 lbs., expansion metal, at 24½c.	.....	139 16		
8,700 lbs., lead coating, at 4¾c.	.....	420 16		
13,329 lbs., yellow brass, at 15⅞c	.....	2,120 90		
9,587¼ lbs., Ajax metal, at 23¾c	.....	2,406 78		
15,358½ lbs., red brass, at 18⅞c.	.....	2,902 75		
Total.....	.....	$7,989 75	$10 25	
Item 28. For the purchase of stationery, blank books, engineers' supplies and printing.. $5,000 00				
Increased by transfer 3,500 00				
Net appropriation to Item.....	$8,500 00			
Engineer supplies.....	.....	$459 68		
Printing.....	.....	229 00		
Stationery, blank books, etc	.....	7,508 45		
Total.....	.....	$8,197 08	$302 92	
Item 29. For clerk hire in writing up duplicates..... $2,500 00				
Diminished by transfer.. 152 15				
Net appropriation.....	$2,347 82	$2,347 82		
Item 30. For keep of horse for Chief of Bureau, General Superintendent and assistant $1,200 00				
Diminished by transfer... 66 66				
Net appropriation to Item	1,133 34	1,133 34		
Item 31. For the purchased of horses and horse shoeing $1,000 00				
Increased by transfer 1,000 00				
Net appropriation to Item	2,000 00			
Horse shoeing.....	.....	1,14 90	858 10	

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.		Amount appropri'd	Amount expended.	Amount merging.	Amount not merg'g
Item 32. For the purchase of tapping machines and fitting		$3,000 00	$2,999 70	$ 30	
Item 33. For the purchase of and repairs to wagons and carts	$2,000 00				
Increased by additional appropriation	1,000 00				
Net appropriation to Item		3,000 00			
Cart	$43 50				
Cart	74 00				
Wagon	155 00				
Wagons, 3 at $177.50	532 50				
Wagons, 2 at $215	430 00				
Repairs	1,289 68				
			$2,524 68	475 32	
Item 34. For the purchase of and repairs to harness and stable supplies		1,000 00	767 31	232 69	
Item 35. For the purchase of donkey pumps and machine tools		2,000 00			
Donkey pumps, 2 at $609			1,218 00	782 00	
Item 36. For asphalt paving and repairs		1,000 00	999 60	40	
Item 37. For advertising office supplies, text books and incidentals	$2,500 00				
Increased by additional appropriation	1,000 00				
Net appropriation to item		3,500 00			
Advertising			307 00		
Card index			98 40		
Carriage hire			25 14		
Disinfectant rental			36 00		
Draping office			142 00		
Electric current			361 15		
Furnishing meals to workmen			78 15		
Ground rent, No. 918 Cherry st			26 66		
Incidentals			173 47		
Incidentals, hydrographic			152 60		
Insurance, fire			242 00		
Maps			219 50		
Morning papers			23 92		
Office supplies			348 55		
Pasture for horse			24 00		
Photo supplies			93 32		
Postage stamps			166 00		
Professional services, V. S			149 95		
Repairs to Transit			60 50		
Rent of office, shop and stable, Fifth District			281 00		
Subscriptions, periodicals			40 30		
Text books			50 66		
Transportation			45 00		
Washing towels			125 50		
Winding clocks			16 00		
Window shades			6 80		
Total			$3,293 57	$206 43	

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.		Amount appropri'd	Amount expended.	Amount merging.	Amount not merg'g.
Item 38. For the purchase of special articles, small stores, repairs to tools, pipes, pavements, wagons, harness, etc	$2,500 00				
Increased by transfer	2,500 00				
Net appropriation to Item		$5,000 00			
Altering gas main			$23 29		
Boiler compound			302 48		
Disinfectant			14 00		
Dynamite			204 00		
Electric current			279 00		
Fittings			26 52		
Force chambers			28 00		
Glass steps			16 00		
Heaters			80 00		
Ice			1,143 39		
Listing			7 05		
Plumbing			110 16		
Plants			92 50		
Repairs to chairs	$6 00				
" creepers	7 00				
" gauge	8 80				
" pavement	8 90				
" filter	10 00				
" tool house	10 25				
" wire	16 21				
" scales	113 55				
			180 71		
Special articles			1,051 89		
Tube cleaner			205 00		
Typewriter, etc			98 00		
Use of dump			5 00		
Valve			90 00		
Waterproofing canvas			110 38		
Total			$4,067 37	$932 63	
Item 39. For the purchase of lead pipe, block tin and sheet lead,	$5,000 00				
Increased by additional appropriat'n and trans.	4,775 00				
Net appropriation to item		9,775 00			
199,475 lbs. lead pipe at 4.90			$9,774 27	$0 73	
Item 40. For emergencies	$4,000 00				
Increased by transfer	1,000 00				
Net appropriation to item		5,000 00			
Repairs to engines			2,862 50		
Supporting tracks			729 95		
Total			$3,592 45	$1,407 55	
Item 41. For the purchase of meters to measure the consumption of water		$5,000 00			

Detailed Expenditures of the Bureau for 1901—Continued.

General Appopriation.	Amount appropri'd.	Amount expended.	Amount merging.	Amount not merg'g.
Item 41—Continued.				
Parts of meters	.....	$33 71		
4 1½-in. Pittsburgh, at $33.00, $132 00				
4 ⅝-in. Worthington, at $25.90 103 60				
4 2-in. Worthington, at $31.65 126 60				
2 6-in.-Standard, at $239.40 478 80				
13 ¾-in. Union, at $11.80. 153 40				
20 1½-in. Union, at $33.00. 660 00				
2 6-in. Hersey at $400.00.. 800 00				
2 6-in. Gem, at $400.00.... 800 00				
13 3-in. Gem, at $90.00.... 1,170 00				
10 2-in. Union at $48.50... 485 00				
	.....	4,909 40		
Total	.....	$4,943 11	$56 89	
Item 42. Hauling ashes from Queen Lane Station..... $3,350 00				
Diminished by transfer.. 760 00				
Net appropriation to item	$2,590 00	$2,299 08	$290 92	
Item 43. For the purpose of furnishing Water to the citizens of Foxchase, balance Jan 1	8,977 17			
Bronze tablet	.....	85 00		
Pumping engine, final payment	.....	8,888 00		
Total	.....	$8,973 00	$4 17	
Item 44: For the improvement of Roxborough Pumping Station, balance Jan. 1	$30,000 00			
Pumping engines	.....	$22,500 00	.....	$7,500 00
Item 45. For new pumping main, Queen Lane Pumping Station to Queen Lane reservoir, balance Jan. 1	2,252 35			
Retained per cent. upon contract for excavating trench	.....	685 47	1,566 88	
Item 46. For repairs to engines, balance Jan. 1	3,650 00			
Pump chambers	.....	3,650 00		
Item 47. For improvement in West Philadelphia, balance Jan. 1	403,873 81			
Filter plant and reservoir	.....	326,046 35	.....	77,827 46
Item 48. For pumping engines at Roxborough, Roxborough High Service and Belmont High Service Stations, balance Jan. 1	46,687 50			
Pumping engine, Roxborough high service, final payment	.....	5,562 50		

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.	Amount appropr'd.	Amount expended.	Amount merging.	Amount not merg'g
Item 48—Continued.				
Pumping engine, Belmont high service, final payment		11,125 00		
Pumping engines, Roxborough, final payment		30,000 00		
Total		$46,687 50		
Item 49. For the improvement, extension and filtration of the water supply, balance Jan 1	1,428,514 31			
Advertising		$363 80		
Ammonia		8 10		
Binding books		52 45		
Boilers (Belmont)		14,250 01		
Brass fittings		406 13		
Brick, stone, etc		5,013 14		
Bronze tablets		170 00		
Carpenter work		553 35		
Chandlery		24 19		
Coal		70 20		
Coke		388 65		
Concrete moulds		134 00		
Donkey pump		120 00		
Electric plants (Belmont and Queen lane		3,796 30		
Electric supplies		1,869 80		
Engine house (Belmont)		53,424 00		
Engineers supplies & chemicals		13,116 52		
Fibre		30 00		
Filters		14 00		
Filter plant (upper Roxborough)		121,684 28		
Filter plant (lower Roxborough)		152,120 28		
Furnishing and laying mains		7,488 14		
Gas for fuel		197 20		
Gum goods		164 41		
Hardware		823 42		
Hauling		5 01		
Hire of horse		235 00		
Incidentals		725 48		
Insurance (fire)		110 00		
Iron beams		548 45		
Iron Safes		200 00		
Iron fittings		539 72		
Iron pipe and special castings		40,474 90		
Laboratory supplies		604 83		
Lead pipe		11 03		
Lumber		363 68		
Machine tools		1,039 00		
Meals for workmen		30 00		
Meters		290 00		
Moving engine, Roxborough to Frankford		16,180 00		
Office supplies		1,752 93		
Oil		22 71		
Paints		123 50		
Platinum Wire		444 95		
Plans and specifications		11 00		
Pumping engines (Belmont)		146,700 00		
Services of architect		2,577 09		
Repairing level		15 60		
Rubber stamps		61 90		

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropriation.	Amount Appropri'd	Amount Expended.	Amount Merging.	Amount not merg'g
Item 49—Continued.				
Sand ejector		$1,719 03		
Services of diver		110 00		
Services of inspectors and expenses		2,181 47		
Shavings		3 50		
Slag		65 62		
Stationery and printing		5,620 98		
Stop boxes		1,563 80		
Subscription (periodicals)		12 25		
Tanks		865 50		
Test borings		4,489 58		
Text books		236 42		
Towel service		85 29		
Transportation		1,294 20		
Trestle		1,044 00		
Typewriter and supplies		148 20		
Valves		14,403 06		
Wages :				
Shop $410 25				
Second district 6,193 13				
Third " 81,565 59				
Fourth " 3,680 69				
Fifth " 31,348 22				
Sixth " 4,371 13				
Seventh " 6,404 26				
Engineer corps 83,680 17				
		217,653 44		
Total		$840,841 45		$587,672 86
Item 50. For filtration	12,000,000 00			
Advertising		$245 55		
Affidavits		22 00		
Binding books		20 50		
Brass fittings		20 15		
Chandlery		70 93		
Coal		65 00		
Electric current		46 76		
Engine supplies		57 06		
Engineers' supplies		71 79		
Filter plant and reservoir (Belmont)		18,110 21		
Furnaces and stoves		154 76		
Furnishing and laying water mains		488,153 08		
Gas for fuel		54 50		
Grease		4 00		
Hauling		353 92		
Hire of horse		32 50		
Incidentals		113 10		
Iron castings		92 04		
Insurance (fire)		91 13		
Laboratory supplies		82 00		
Meters		90 00		
Oil		140 59		
Office supplies		20 84		
Pumping station (Upper Roxborough)		2,220 39		
Pipe inspectors and expenses		719 35		
Repairs to asphalt pavement		1,537 25		
Sand and gravel		64 35		
Slag		48 08		
Testing station (Torresdale)		6,769 98		
Transportation		120 00		

Detailed Expenditures of the Bureau for 1901—Continued.

General Appropria.ion.		Amount Approp'd.	Amount Expended.	Amount merging.	Amount not merg'g.
Item 50—Continued.					
Towel Service			40 20		
Wages.					
Second District	$158 94				
Third District	988 03				
Fourth District	170 94				
Engineering Corps	24,161 17				
			25,479 08		
Total			$545,111 09		11,454,888 91
Item 51. For High Pressure Services, balance January 1		$300,000 00			
Incidentals			$34 73		
Inspecting			474 81		
Fire hydrants, 62 at $110	$6,820 00				
Less 20 per cent	1,364 00				
			5,456 00		
Furnishing and laying pipe line	$194,341 71				
Less 20 per cent	38,868 33				
			155,473 38		
Wages			2,534 40		
Total			$163,973 32		$136,026 68
Item 52. To pay bills of Macey, Henderson & Co. for alterations and additions to the Roxborough Pumping Station, Ordinance June 12, 1901	$3,500 00				
Diminished by transfer	520 00				
Net appropriation to item		2,980 00	2,980 00		

RECAPITULATION.

General Appropriation.			
Balance from books of 1900	$5,223,955 14		
Additional appropriations and transfers.	9,361,261 34		
Annual appropriation		$1,192,733 00	$15,777,949 48
Expended for maintenance	$1,524,201 00		
Expended for extensions	1,945,159 21		
		3,469,360 21	
Amount merging	$26,924 52		
Amount not merging	12,263,915 91		
Amount transferred	17,748 84		
		12,308,589 27	15,777,949 48

APPENDIX B

REPORT

OF THE

GENERAL SUPERINTENDENT

SUBMITTING

TABLES OF EXPENSES, PUMPAGE AND CONSUMPTION OF WATER DURING 1901

Philadelphia, January 16, 1902.

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 1901.

The tables herewith submitted show the average daily maximum and minimum, as well as the monthly and total, pumpage and consumption for the year.

During 1901, as in the preceding year, the improvements to the machinery, repairs to leaky water appliances, etc., resulted in a material decrease in the quantity of water pumped. The average daily reduction in the pumpage was 7,857,287 gallons.

There was also a corresponding reduction of 14,033 tons in the total quantity of coal consumed, amounting, at contract prices, to $40,588.63.

The following repairs, changes and improvements, in addition to many others of minor importance, were made at the several pumping stations:

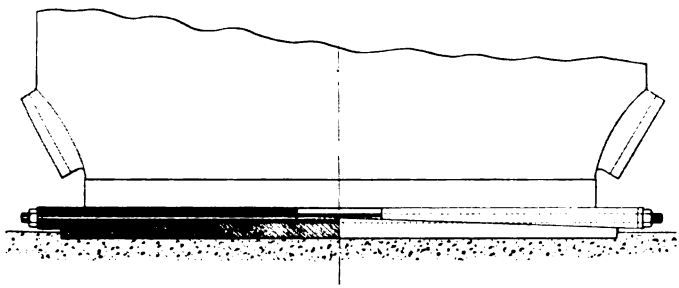
Spring Garden Station.

Early in the year the air pump was removed from No. 2 engine and a 14-inch "Schutte" condenser attached in place thereof. The exchange, however, has not proven altogether satisfactory, as the vacuum is not nearly so high as it was with the old air pump; but the engine is relieved of the load necessary to operate the air pump, and it is found that, even under the present conditions, the "Schutte" condenser is fully as economical in the use of coal, and we have no bills for repairs in connection therewith, as was frequently the case under the former arrangement.

A similar condenser has been provided for the No. 3 engine, but it has not yet been installed, as it is considered best not to do this until an opportunity presents to make a material change in the valve motions of both Nos. 2 and 3 engines in order that they may be operated as high-duty engines.

Considerable trouble has been experienced with the foundations under the high-pressure pumps of both these engines. The foundations are of concrete, and the vibration, or a slight vertical movement in the pump chamber, caused by the up-stroke of the engines, created a vacuum between the base of the pump and the concrete foundations. This space immediately filled with water, which was then forced out again by the down-stroke. The constant drawing in and forcing out of the water in this manner wore away the surface of the concrete, and in

the case of the No. 3 pump cut out considerable of the foundation. The latter was repaired by squaring up the washed-out space and inserting a block of granite, the whole being re-grouted with neat cement.



ADJUSTABLE CAST IRON BASE, NO. 2 PUMP.
SPRING GARDEN WORKS.

These repairs have not proved to be altogether satisfactory, as it is evident that the cement surface is again wearing away and will soon require further attention.

The repairs to the foundation of No. 2 engine were made in a different manner, as follows:

The concrete was removed to a depth of about ten (10) inches below the pump chamber and the whole surface covered with cast iron plates bedded in cement, so as to form two inclined planes with summits joining under the centre line of the pump. On top of the inclined planes were placed grooved iron wedges, one opposite the other, both being drawn together by rods placed within the grooves and extending from and to the outer ends of each pair of wedges. The tightening of these rods draws the wedges up the inclined surface and thus takes up all the lost motion in the pump chambers.

So far this arrangement has proven entirely satisfactory, and, if necessary, No. 3 pump will be repaired in a similar manner.

No. 5 engine was shut down for a short time in order

to make repairs to cross-head and to tighten the plungers. The steam valves were also reset and the pump is now in good running order.

No. 6 pump is out of service the greater part of the time owing to lack of steam power, when all the others are running, to operate it. A new cross-head and a bucket valve have been provided for it, and other minor repairs necessary to place it in good condition have been made.

Nos. 7 and 11 engines have received little attention in the way of repairs, and much remains to be done to them in this respect. So far, however, there has been no opportunity to shut down these pumps for such purpose.

A new pump head, to replace a broken one, was provided for No. 8 engine, and the latter has since been in good condition.

During the past year the boilers at this station were all thoroughly cleaned, the "Deane Tube Cleaner" being used to remove scale from the tubes. The cleaner did its work quite effectually, the steam power of the boilers being greatly increased through its use.

Belmont Station.

As soon as the three (3) new 10,000,000 gallon pumps were put into service, the old Worthington No. 1 pump was shut down for repairs. This engine was thoroughly over-hauled; the air pumps were rebored and provided with new pistons.

No. 2 engine is undergoing similar repairs, upon the completion of which Nos. 3 and 4 will likewise be put into good condition.

The boilers were all thoroughly cleaned, leaky steam pipes and valves were repaired, and feed pumps relocated on new foundations—all of which are now in excellent condition.

Queen Lane Station.

The breaking of pump chambers, several of which have required renewal, has caused quite a great deal of trouble at this station, in addition to that caused by the foundations, which were almost constantly in need of repairs. Considerable attention has been given to the latter, which are of concrete, and the surface of which wore away and became greatly disintegrated by the action of the water drawn between the pump and the foundation and then forced out again at each stroke of the pump. Suitable drains to prevent the water collecting as described are now in course of construction, those for No. 2 pump being already completed, and for Nos. 1, 3 and 4 pumps about 70 per cent. done. The balance of the work thereon has been delayed by lack of opportunity to shut down the engines to complete it.

During the past year all the boilers at this station have been thoroughly cleaned. New tubes and safe-ended tubes have been put in 20 of the 24 boilers, and all steam pipes have been taken down and the joints recaulked.

Roxborough Station.

Repairs to Nos. 2 and 3 Worthington pumps, begun last year, have been completed. New pump chambers have been substituted for broken ones, valves and valve seats have been refaced and new diaphragms provided, all combining to put these engines in excellent condition and ready for service whenever it may be necesary to shut down any of the new pumps, which, owing to their economy in fuel, are kept running in preference to the old ones.

Frankford Station.

There has also been considerable difficulty experienced with all three of the old pumps at this station.

The right-hand discharge chamber on No. 1 pump split several feet—from the top downward. The broken chamber was braced with wooden timbers and the engine continued in service for some time, but the shoring finally gave way and the cracks in the chamber lengthened until they reached the bottom of the pump. Heavy 12 x 12 timbers were then placed on both sides of the pump chamber, and were held together with 2-inch iron rods. These sustained the broken sections in position sufficiently to run the pump and get at least some service out of it.

On July 29 the bonnet on the lower chamber of No. 3 pump broke and was repaired on the same day. On the night of the 30th, however, the chamber itself broke, the fractured section measuring 15 x 24 inches. On the same night this section was replaced in the broken chamber and held in position with wooden shoring, but the chamber, in this crippled condition, failed to stand the strain upon it, and a second attempt to replace and hold the broken section in position by shoring, made on the morning of the 31st, proved equally ineffectual.

On August 2d the pump valves were blanked off and the broken chamber thrown out of service. The engine has since been run in that condition.

Trouble was also experienced by the breaking of minor parts of No. 2 pump, which, in connection with the crippled condition of Nos. 1 and 3 engines, made it impossible to keep up the supply in the Wentz Farm reservoir, and we were obliged to shut off the new 48-inch Wentz Farm supply main; also, in order to reduce the consumption, to draw water from the Queen Lane system to assist that of Wentz Farm.

These latter expedients would also have failed, owing to the breaking down of No. 2 pump at the Queen Lane station, but for the fact that at that time the newly erected No. 4 engine at the Frankford works was ready for ser-

vice, and the running of this pump removed all danger of a failure to supply water to the northeastern section of the City.

Engines Nos. 1, 2 and 4 are now in service and No. 3 is undergoing repairs, upon completion of which Nos. 1 and 2 engines will receive similar attention.

High-Service Stations.

All the engines and boilers at the high-service stations are in excellent condition.

Reservoirs.

Numerous repairs have been made to the embankments, fencing and inside lining of the majority of the reservoirs.

A number of slides, or wash-outs, occurred in the outside embankments of the Fairmount, East Park and Lehigh reservoirs, all of which were repaired with the exception of those caused by the recent heavy storms. The work of repairing the latter will be completed as soon as the weather conditions will permit.

During the latter part of April an extensive washout occurred in the inside embankment, directly under the inlet pipe, at the southeast corner of the west basin of the East Park reservoir.

The protective apron, made of wood and sheathed with thin iron plates, was almost entirely washed away, as was also the inside brick lining of the reservoir and the earth embankment directly beneath the apron.

In order to make repairs it became necessary to draw off the water in the reservoir to a depth of three feet. A coffer-dam was constructed in front of the washout and drained by hand pumps.

After reconstructing the earth embankment and refacing the brick lining, a sheet steel apron, extending from

the overflow pipe to the bottom of the reservoir, was set in position and grouted with neat cement.

This work was completed and water turned into the basin May 1st.

While lowering the water in the reservoir for the purpose of doing the above work, it was observed that the apron in the east basin was in bad condition, and this also was immediately put in thorough repair.

Similar attention was given to the apron at the Belmont reservoir.

Very respectfully yours,

ALLEN J. FULLER,

General Superintendent.

NS FOR THE YEAR 1901.

pairs to oilers and chinery.	Miscellaneous Supplies and Small Stores.	Total Expenses.	Tot I
$1,856 48	$301 62	$17,007 30	7
21,851 07	4,741 24	272,015 00	45
14,937 14	1,802 25	152,691 27	11
18,678 45	4,402 44	207,544 64	24
9,177 35	2,109 08	112,463 43	5
9,445 46	1,516 63	69,516 24	7
75,945 95	$14,873 26	$831,237 88	101
$196 75	$171 47	$12,100 91	
254 14	342 04	11,949 46	
57 86	118 53	7,057 12	
10 75	11 11	3,399 22	
54 00	184 13	6,141 76	
573 50	$827 28	$40,648 47	
76,519 45	$15,700 54	$871,886 35	10
.....	$11,063 36	$61,808 71	...
20,547 52	.....	.....	

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

BELMONT HIGH SERVICE STATION, 1901.

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

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

1901.	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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 1.	No. 2.	
January	360	38	17,345,630	7,223,550	24,569,180	792,554	96	620	.25	96	8	64	70	149.3
February	364	.....	17,493,750	.....	17,493,750	624,777	82	1,540	.25	42	7	65	.....	123.8
March	351	57	16,724,880	9,073,490	25,798,370	832,205	96	1,005	.25	123	8	64	65	156.5
April	337	116	16,232,035	17,941,135	34,173,170	1,139,106	107	1,635	.25	105	133	61	75	185.6
May	523	39	25,110,365	6,306,450	31,416,815	1,013,446	113	1,235	.25	50	51	61	75	161.9
June	431	185	20,294,705	28,597,995	48,892,700	1,629,757	127	1,600	.25	107	209	63	75	224.0
July	461	202	22,167,675	35,080,378	57,248,053	1,846,711	135	1,790	.25	120	49	65	73	246.7
August	448	200	21,443,860	25,092,000	46,535,860	1,501,157	120	1,570	.25	154	8	65	73	225.6
September	403	165	19,414,220	17,694,750	37,108,970	1,236,966	111	935	.25	118	8	66	73	194.9
October	385	172	18,760,900	17,092,350	35,853,251	1,156,556	110	1,510	25	148	8	65	73	189.5
November	422	65	20,326,365	7,204,575	27,530,940	917,698	98	1,055	.25	82	8	65	73	163.5
December	427	52	20,448,970	6,363,950	26,812,920	864,932	104	1,235	.25	91	8	65	75	150.0
Totals and Averages.	4,912	1,291	235,763,355	177,670,623	413,433,978	1,132,696	1,306	50	.25	1,236	505	64	73	185.2

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

ROXBOROUGH HIGH SERVICE STATION, 1901.

Total Capacity 10,000,000 gallons per day.

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

1901.	Running Time of each Engine in Hours.		Gallons Pumped by each Engine.		Total Pumped 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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 1.	No. 2.	
January	744	.....	111,731,000	.....	111,731,000	3,604,226	180	2,210	.25	124	8	56	.....	304.5
February	651	13	101,347,260	2,561,865	103,909,125	3,711,040	173	1,680	.25	120	7	56	56	295.5
March	281	461	43,329,330	69,331,125	112,660,455	3,634,208	139	280	.25	257	8	56	56	399.5
April	3	716	579,150	105,166,590	105,745,740	3,505,553	101	2,000	.25	292	23	56	56	512.8
May	18	725	3,463,020	111,497,875	114,960,895	3,708,416	108	190	.25	200	11	56	56	524.7
June	86	633	15,527,130	98,431,200	113,958,330	3,798,611	120	1,930	.25	241	21	56	56	465.1
July	33	710	6,168,690	112,559,290	118,727,980	3,829,935	113	630	.25	167	23	56	56	517.0
August	.....	744	.....	115,816,390	115,816,390	3,736,013	1 5	1,910	.25	155	23	.....	56	539.7
September	3	715	570,240	114,452,085	115,022,325	3,834,078	103	360	.25	150	22	25	27	550.0
October	40	704	7,688,440	113,842,225	121,530,665	3,920,344	118	750	.25	158	24	56	56	506.6
November	248	469	40,264,930	76,866,400	117,131,330	3,904,378	144	530	.25	162	20	56	56	490.5
December	31	711	5,978,000	117,582,830	123,560,830	3,985,833	125	390	.25	155	23	56	56	487.0
Totals and averages	2,138	6,601	336,647,190	1,038,107,875	1,374,755,065	3,766,452	1,534	1,060	.25	2,261	213	53	53	441.9

No. 1—Davidson Rotary, Capacity 1,000,000 Gallons per Day.

No. 2—Davidson Rotary, Capacity 1,000,000 Gallons per Day.

MOUNT AIRY PUMPING STATION.
1901.

Total Capacity 3,000,000 Gallons per Day.

No. 3—Knowles Rotary, Capacity 1,000,000 Gallons per Day.

1901.	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	408	336	.....	19,091,250	15,732,500	.....	34,823,750	1,123,347	103	1,780	.25	31	8	60	60	.....	165.6
February	670	50	.....	31,314,000	2,347,500	.....	33,661,500	1,202,196	96	960	.25	29	7	60	60	.....	172 3
March	413	.....	.....	19,316,250	.....	.....	19,316,250	623,105	66	1,660	.25	18	8	60	.....	.....	143 3
April	.....	.....	.....	.....	.....	.....	.....	.....	20	200	.25	.....	.....	.....	.....	.....	.....
May	.....	.....	.....	.....	.....	.....	.....	.....	20	1,700	.25	.....	.....	.....	.....	.....	.....
June	153	46	.....	7,322,500	2,167,500	.....	9,490,000	316,333	39	1,840	.25	8	5	60	60	.....	117.6
July	44	20	.....	2,313,750	870,000	.....	3,183,750	102,702	27	920	.25	4	2	60	60	.....	57.3
August	4	.....	.....	195,000	.....	.....	195,000	6,290	21	160	.25	.....	.....	60	.....	.....	4.6
September	.....	50	.....	.....	2,377,500	.....	2,377,500	79,250	25	1,300	.25	2	2	.....	60	.....	45.9
October	.....	40	.....	.....	1,650,000	.....	1,650,000	53,226	24	240	.25	3	1	.....	60	.....	33.8
November	62	216	.....	3,003,750	10,335,000	.....	13,338,750	444,625	51	1,260	.25	11	4	50	50	.....	127.7
December	4	3	.....	195,000	146,250	.....	341,250	11,008	21	1,260	.25	1	.....	60	60	.....	7.8
Totals and Averages..	1,758	761	.....	82,751,500	35,626,250	.....	118,377,750	324,323	518	2,080	.25	107	37	59	59	.....	112.6

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

CHESTNUT HILL PUMPING STATION, 1901.

Total Capacity, 750,000 gallons per day.

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

1901.	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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 1.	No. 2.	
January	.....	54	.....	2,324,700	2,324,700	74,990	14	1,215	.25	4	.....	.....	50	80.5
February	60	.....	1,984,790	.....	1,984,790	69,599	13	1,485	.25	4	.....	50	.....	73.1
March	58	.....	1,809,600	.....	1,809,600	58,374	13	858	.25	4	.....	50	.....	68.4
April	28	.....	967,200	.....	967,200	32,240	10	1,714	.25	2	.....	50	.....	45.2
May	.....	30	.....	1,255,000	1,255,000	40,483	11	1,770	.25	2	.....	.....	50	53.6
June	19	.....	628,300	.....	628,300	20,943	10	532	.25	2	.....	50	.....	30.9
July	.....	4	.....	165,280	165,280	5,331	9	955	.25	1	.....	.....	50	8.8
August	.....	.....	.....	.....	.....	.....	8	780	.25	.....	.....	.....	.....	.....
September	.....	4	.....	167,280	167,280	5,576	7	720	.25	1	.....	.....	50	11.5
October	.....	.....	.....	.....	.....	.....	7	880	.25	.....	.....	.....	.....	.....
November	.....	18	.....	902,760	902,760	30,092	10	1,120	.25	.....	.....	.....	50	43.2
December	.....	3	.....	125,460	125,460	4,047	8	1,380	.25	1	.....	.....	50	7.3
Totals and averages..	165	113	5,389,890	4,940,480	10,330,370	28,302	125	2,209	.25	21	.....	50	50	41.2

No. 1—**Holly Rotary Duplex** Auria Horizontal Compound ; **Capacity, 3,000,000** gpacity, 4,000,000 gallons per day.

1901.	Oils.		Mean Water Pressure per Square Inch, less Mean Pressure on Suction Pipe.		Gallons raised 100 feet per pound of coal.
	Cylinder.	Engine.			
Months.	Qts.	Qts.	No. 1.	No. 2.	
January	46	25	71	.....	257.3
February	30	16	71	.....	144.7
March	23	17	71	.....	97.8
April	9	10	71	.....	85 8
May	12	9	71	.....	93.0
June	16	11	71	.....	116.5
July	24	23	71	.. ..	177.2
August	14	15	71	.....	112.6
September	15	14	71	.....	105.6
October	16	17	71	.....	106.2
November	15	14	71	.....	84.1
December	15	12	71	.....	78.0
Totals and averages	235	183	71	.....	130.9

the overflow pipe to the bottom of the reservoir, was set in position and grouted with neat cement.

This work was completed and water turned into the basin May 1st.

While lowering the water in the reservoir for the purpose of doing the above work, it was observed that the apron in the east basin was in bad condition, and this also was immediately put in thorough repair.

Similar attention was given to the apron at the Belmont reservoir.

Very respectfully yours,

ALLEN J. FULLER,

General Superintendent.

; FOR THE YEAR 1901.

-s to -rs l -nery.	Miscellaneous Supplies and Small Stores.	Total Expenses.	Tot E
56 48	$301 62	$17,007 30	7
51 07	4,741 24	272,015 00	45
37 14	1,802 25	152,691 27	11
78 45	4,402 44	207,544 64	24
77 35	2,109 08	112,463 43	5
45 46	1,516 63	69,516 24	7
945 95	$14,873 26	$831,237 88	101
196 75	$171 47	$12,100 91	
254 14	342 04	11,949 46	
57 86	118 53	7,057 12	
10 75	11 11	3,399 22	
54 00	184 13	6,141 76	
573 50	$827 28	$40,648 47	
,519 45	$15,700 54	$871,886 35	10
....	$11,663 36	$61,808 71	...
),547 52	....	....	

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

BELMONT HIGH SERVICE STATION, 1901.

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

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

1901.	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. 1.	No 2.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 1.	No. 2.	
January	360	38	17,345,630	7,223,550	24,569,180	792,554	96	620	.25	96	8	64	70	149.3
February	364	.....	17,493,750	.....	17,493,750	624,777	82	1,540	.25	42	7	65	.....	123.8
March	351	57	16,724,880	9,073,490	25,798,370	832,205	96	1,005	.25	123	8	64	65	156.5
April	337	116	16,232,035	17,941,135	34,173,170	1,139,106	107	1,635	.25	105	133	61	75	185.6
May	523	39	25,110,365	6,306,450	31,416,815	1,013,446	113	1,235	.25	50	51	61	75	161.9
June	431	185	20,294,705	28,597,995	48,892,700	1,629,757	127	1,600	.25	107	209	63	75	224.0
July	461	202	22,167,675	35,080,378	57,248,053	1,846,711	135	1,790	.25	120	49	65	73	246.7
August	448	200	21,443,860	25,092,000	46,535,860	1,501,157	120	1,570	.25	154	8	65	73	225.6
September	403	165	19,414,220	17,694,750	37,108,970	1,236,966	111	935	.25	118	8	66	73	194.9
October	385	172	18,760,900	17,092,350	35,853,251	1,156,556	110	1,510	25	148	8	65	73	189.5
November	422	65	20,326,365	7,204,575	27,530,940	917,698	98	1,055	.25	82	8	65	73	163.5
December	427	52	20,448,970	6,363,950	26,812,920	864,932	104	1,235	.25	91	8	65	75	150.0
Totals and Averages.	4,912	1,291	235,763,355	177,670,623	413,433,978	1,132,696	1,306	50	.25	1,236	505	64	73	185.2

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

ROXBOROUGH HIGH SERVICE STATION, 1901.

Total Capacity 10,000,000 gallons per day.

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

1901.	Running Time of each Engine in Hours.		Gallons Pumped by each Engine.		Total Pumped 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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Qts.	Qts.	No. 1.	No. 2.	
January	744	.....	111,731,000	.....	111,731,000	3,604,226	180	2,210	.25	124	8	56	.....	304.5
February	651	13	101,347,260	2,561,865	103,909,125	3,711,040	173	1,680	.25	120	7	56	56	295.5
March	281	461	43,329,330	69,331,125	112,660,455	3,634,208	139	280	.25	257	8	56	56	399.5
April	3	716	579,150	105,166,590	105,745,740	3,505,553	101	2,000	.25	292	23	56	56	512.8
May	18	725	3,463,020	111,497,875	114,960,895	3,708,416	108	190	.25	280	11	56	56	524.7
June	86	633	15,527,130	98,431,200	113,958,330	3,798,611	120	1,930	.25	241	21	56	56	465.1
July	33	710	6,168,690	112,559,290	118,727,980	3,829,935	113	630	.25	167	23	56	56	517.0
August	.....	744	.....	115,816,390	115,816,390	3,736,013	1 5	1,910	.25	155	23	.....	56	539.7
September	3	715	570,240	114,452,085	115,022,325	3,834,078	103	360	.25	150	22	25	27	550.0
October	49	704	7,688,440	113,842,225	121,530,665	3,920,344	118	750	.25	158	24	56	56	506.6
November	248	469	40,264,930	76,866,400	117,131,330	3,904,378	144	530	.25	162	20	56	56	400.5
December	31	711	5,978,000	117,582,830	123,560,830	3,985,833	125	390	.25	155	23	56	56	487.0
Totals and averages	2,138	6,601	336,647,190	1,038,107,875	1,374,755,065	3,766,452	1,534	1,060	.25	2,261	213	53	53	441.9

No. 1—Davidson Rotary, Capacity 1,000,000 Gallons per Day.

No. 2—Davidson Rotary, Capacity 1,000,000 Gallons per Day.

MOUNT AIRY PUMPING STATION.
1901.

Total Capacity 3,000,000 Gallons per Day.

No. 3—Knowles Rotary, Capacity 1,000,000 Gallons per Day.

1901.	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	408	336	.....	19,091,250	15,732,500	.....	34,823,750	1,123,347	103	1,780	.25	31	8	60	60	.....	165.6
February	670	50	.....	31,314,000	2,347,500	.....	33,661,500	1,202,196	96	960	.25	29	7	60	60	.....	172.3
March	413	.....	.....	19,316,250	.....	.....	19,316,250	623,105	66	1,660	.25	18	8	60	.....	.....	143.3
April	.....	.....	.....	.....	.....	.....	.....	.....	20	200	.25	.....	.....	.....	.....	.....	.....
May	.....	.....	.....	.....	.....	.....	.....	.....	20	1,700	.25	.....	.....	.....	.....	.....	.....
June	153	46	.....	7,322,500	2,167,500	.....	9,490,000	316,333	39	1,840	.25	8	5	60	60	.....	117.6
July	44	20	.....	2,313,750	870,000	.....	3,183,750	102,702	27	920	.25	4	2	60	60	.....	57.3
August	4	.....	.....	195,000	.....	.....	195,000	6,290	21	160	.25	.....	.....	60	.....	.....	4.6
September	.....	50	.....	.....	2,377,500	.....	2,377,500	79,250	25	1,300	.25	2	2	.....	60	.....	45.9
October	.....	40	.....	.....	1,650,000	.....	1,650,000	53,226	24	240	.25	3	1	.....	60	.....	33.8
November	62	216	.....	3,003,750	10,335,000	.....	13,338,750	444,625	51	1,260	.25	11	4	50	50	.....	127.7
December	4	3	.....	195,000	146,250	.....	341,250	11,008	21	1,260	.25	1	.....	60	60	.....	7.8
Totals and Averages	1,758	761	.....	82,751,500	35,626,250	.....	118,377,750	324,323	518	2,080	.25	107	37	59	59	.....	112.6

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

CHESTNUT HILL PUMPING STATION, 1901.

Total Capacity, 750,000 gallons per day.

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

1901.	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. 1.	No. 2.	Gallons.	Gallons.	Tons.	Lbs.		Quarts.	Quarts.	No. 1.	No. 2.	
January	.....	54	.....	2,324,700	2,324,700	74,990	14	1,215	.25	4	.....	.....	50	80.5
February	60	.....	1,984,790	.....	1,984,790	69,599	13	1,485	.25	4	.....	50	.....	73.1
March	58	.....	1,809,600	.....	1,809,600	58,374	13	858	.25	4	.....	50	.....	68.4
April	28	.....	967,200	.....	967,200	32,240	10	1,714	.25	2	.....	50	.....	45.2
May	.....	30	.....	1,255,000	1,255,000	40,483	11	1,770	.25	2	.....	.....	50	53.6
June	19	.....	628,300	.....	628,300	20,943	10	532	.25	2	.....	50	.....	30.9
July	.....	4	.....	165,280	165,280	5,331	9	955	.25	1	.....	.....	50	8.8
August	.....	.....	.....	.....	.....	.....	8	780	.25	.....	.....	.....	.....	.....
September	.....	4	.....	167,280	167,280	5,576	7	720	.25	1	.....	.....	50	11.5
October	.....	.....	.....	.....	.....	.....	7	880	.25	.....	.....	.....	.....	.....
November	.....	18	.....	902,760	902,760	30,092	10	1,120	.25	.....	.....	.....	50	43.2
December	.....	3	.....	125,460	125,460	4,047	8	1,380	.25	1	.....	.....	50	7.3
Totals and averages..	165	113	5,389,890	4,940,480	10,330,370	28,302	125	2,209	.25	21	.....	50	50	41.2

No. 1—Holly Rotary Duplex 'Auria Horizontal Compound ; Capacity, 3,000,000 gapacity, 4,000,000 gallons per day.

1901.	Oils.		Mean Water Pressure per Square Inch, less Mean Pressure on Suction Pipe.		Gallons raised 100 feet per pound of coal.
	Cylinder.	Engine.			
Months.	Qts.	Qts.	No. 1.	No. 2.	
January	46	25	71	.....	257.3
February	30	16	71	.....	144.7
March	23	17	71	.....	97.8
April	9	10	71	.....	85.8
May	12	9	71	.....	93.0
June	16	11	71	.....	116.5
July	21	23	71	.. ..	177.2
August	14	15	71	.....	112.6
September	15	14	71	.....	105.6
October	16	17	71	.....	106.2
November	15	14	71	.....	84.1
December	15	12	71	.....	78.0
Totals and averages	235	183	71	.....	130.9

APPENDIX C

REPORT

OF THE

ASSISTANT IN CHARGE OF DISTRIBUTION

Philadelphia, January 20, 1902.

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 1901:

Mains.

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

New Work.

Service mains laid	108,692 feet.
Supply mains laid	8,701 feet.
Pumping mains laid	2,298 feet.
Connections, etc.	9,664 feet.
Total	129,355 feet.

Comparison of Conditions relative to the Distribution, 1900-1901.

	1900	1901	Increase.	Decrease
Service mains, 6-in. to 12-in.	109,159	108,692	.....	467
Supply mains, 10-in. to 48-in.	57,516	8,701	.....	48,815
Pumping mains, 12-in. to 48-in.	15,186	2,298	.....	12,888
Fire main, 10-in.	2,799	.....	.....	2,799
Connections and miscellaneous work	11,518	9,664	.....	1,854
Totals in feet	196,178	129,355	.....	66,823
Re-laid, 6-in. to 36-in.	32,282	20,794	.....	11,488
Miscellaneous repairs, 3-in. to 48-in.	3,643	6,240	2,597	
Taken up, 3-in. to 48-in.	25,068	14,218	.....	10,850
Lowered, raised and shifted, 6-in. to 48-in	3,222	5,003	1,781	
Totals in feet	64,215	46,255	4,378	22,338
Pipe cut off and abandoned, 3-in. to 20-in.	9,259	5,287	.....	3,972

Meters.

	1900	1901	Increase.	Decrease
Meters in use	1,268	1,435	167	

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

	1900	1901	Increase.	Decrease
Dwellings with water	237,011	240,168	3,157	
Dwellings without water	12,467	12,493	26	
Water closets	232,457	250,331	17,874	
Baths	273,477	279,128	5,651	
Wash paves	94,346	95,842	1,496	
Basins and sinks	97,252	103,714	6,462	
Urinals	5,249	5,539	290	

Repairs.

Mains re-laid	20,794 feet	
Repairs and connections	6,240 feet	
		27,034 feet.
Old pipe taken up	14,218 feet	
Pipe lowered, raised and shifted	5,003 feet	
		19,221 feet.
Total		46,255 feet.

Abandoned.

Three-inch	234 feet.
Four-inch	1,804 feet.
Six-inch	1,478 feet.
Eight-inch	26 feet.
Twelve-inch	1,745 feet.
Total	5,287 feet.

The total quantity of pipe handled for all purposes throughout the year was 175,610 feet, weighing 12,868,-101 pounds.

The total quantity of new pipe laid was 129,355 feet, or 24.50 miles, making, in addition to that previously laid, 1,363.17 miles now in use.

Fire Hydrants.

New style fire hydrants in new locations	443
Old style fire hydrants in new locations	...
New style fire hydrants in place of old style	271
Old style fire hydrants in place of other of the old style	...
Total	714
New style fire hydrants taken out	43
Old style fire hydrants taken out	20
Total	63

The total number of new-style fire hydrants added to the distribution system was 380, and the total number in use December 31, 1901, was 13,000, of which 582 are of the old-style, and 12,418, or 95.5 per cent., are of the new pattern.

Drills for Attachments.

The following new attachments were made to the mains:

One-half inch	4,491	area of openings..	882 square inches.
Five-eighth inch	273	area of openings..	84 square inches.
Three-quarter inch.	115	area of openings..	51 square inches.
One-inch	106	area of openings..	83 square inches.
One and one-quarter inches	23	area of openings..	28 square inches.
One and one-half inches	41	area of openings..	72 square inches.
Two inches	78	area of openings..	245 square inches.
Three inches	4	area of openings..	28 square inches.
Four inches	10	area of openings..	126 square inches.
Six inches	3	area of openings..	85 square inches.
Total	5,144	area of openings..	1,684 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."

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

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

Respectfully submitted,

W. WHITBY,

Assistant in Charge of Distribution.

SERVICE AND SUPPLY MAINS LAID DURING 1901.

First District.

Comprising the 1st, 2d, 3d, 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	30	
New pipe or feet added.	Service mains			7,282	500	2,094	200		10,076
	Fire hydrant connections			358					358
	Fire connections (private)		20	60					80
	Supply connections (private)	24							24
	Total ... Feet	24	20	7,700	500	2,094	200		10,538
	Total ... Pounds	360	380	254,100	21,000	115,170	14,400		405,410
Pipe used but adding nothing to feet in ground.	Pipe relaid			1,420	121				1,541
	Repairs, general			180	3	27	12	6	228
	Pipe taken up	216	795	454	76				1,541
	Pipe shifted			762					762
	Total ... Feet	216	795	2,816	200	27	12	6	4,072
	Total ... Pounds	3,240	15,105	92,928	8,400	1,485	864	1,992	124,014
	Total handled ... Feet	240	815	10,516	700	2,121	212	6	14,610
	Total handled ... Pounds	3,600	15,485	317,028	29,400	116,655	15,264	1,992	529,424
	Pipe cut off and abandoned			52	26				88

Second District.

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

	Purposes for which used.	Size in Inches.						Total in feet and pounds.
		3	4	6	8	10	12	
New pipe or feet added.	Service mains			2,139	560			2,699
	Bye-pass connections					88	8	96
	Fire hydrant connections			195				195
	Fire connections (private)	12	41	139				192
	Supply connections (private)	116	98	33				247
	Supply connections laid to curb	13						13
	Drains			136				136
	Total—Feet	141	139	2,642	560	88	8	3,578
	Total—Pounds	2,115	2,041	87,186	23,520	4,840	576	120,878
Pipe used but adding nothing to feet in ground.	Pipe relaid			2,738		2,778		5,516
	Repairs general	3	36	436	91	30		596
	Pipe taken up		672	127		18		817
	Pipe shifted			401		92		493
	Total—Feet	3	708	3,702	91	2,918		7,422
	Total—Pounds	45	13,452	122,166	3,822	160,490		299,975
	Total handled—Feet	144	847	6,344	651	3,006	8	11,000
	Total handled—Pounds	2,160	16,093	209,352	27,342	165,330	576	420,853
	Pipe abandoned	234	1,369					1,603

THIRD DISTRICT.

Comprising the 18th, 19th, 23d, 25th, 35th, 41st, and part of 22d, 33d and 37th Wards.

	Purposes for which used.	Size in Inches. 3	4	6	8	10	12	16	20	30	36	48	Total in feet and pounds.
New pipe or feet added.	Service mains	.....	.....	26,357	1,362	.....	7,347	.....	.....	.....	.....	.....	35,066
	Supply mains	.....	.....	.....	.....	.....	.....	.....	.....	45	1,096	4,804	5,945
	Pumping mains	.....	.....	.....	.....	.....	173	.....	813	.....	251	.....	1,237
	Pumping main connections	.....	.....	17	.....	.....	.....	57	25	.....	62	.....	161
	Bye-pass connections	.....	.....	.....	24	11	18	.....	.....	.....	.....	.....	53
	Fire hydrant connections	.....	.....	1,909	.....	.....	.....	.....	.....	.....	.....	.....	1,909
	Fire connections (private)	.....	.....	24	.....	.....	.....	.....	.....	.....	.....	.....	24
	Supply connections (private)	19	56	32	.....	.....	.....	.....	.....	.....	.....	.....	107
	Drains	.....	.....	139	.....	.....	.....	.....	.....	.....	.....	.....	139
	Total..... Feet	19	56	28,478	1,386	11	7,538	57	838	45	1,409	4,804	44,641
	Total..... Pounds	285	1,064	939,774	58,212	605	542,736	6,270	133,242	14,940	594,598	2,810,340	5,102,066
Pipe used, but adding nothing to feet in ground.	Pipe relaid	.....	.....	6,559	.....	.....	.....	.....	.....	131	.....	.....	6,690
	Repairs, general	.....	39	618	17	23	6	6	.....	9	.....	.....	718
	Pipe taken up	.....	5,570	912	.....	.....	.....	.....	.....	188	.....	.....	6,670
	Pipe lowered	.....	33	433	.....	.....	132	.....	.....	640	.....	.....	1,238
	Total..... Feet	.....	5,642	8,522	17	23	138	6	.....	968	.....	.....	15,316
	Total..... Pounds	.....	107,198	281,226	714	1,265	9,936	660	.....	321,376	.....	.....	722,375
	Total handled Feet	19	5,698	37,000	1,403	34	7,676	63	838	1,013	1,409	4,804	59,957
	Total handled Pounds	285	108,262	1,221,000	58,926	1,870	552,672	6,930	133,242	336,316	594,598	2,810,340	5,824,441
Pipe cut off and abandoned		.....	106	67	.....	.....	.....	.....	.....	.....	.....	.....	173

Fourth District.

Comprising the 15th, 20th, 28th, 29th, 32d, 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	30	36	48	
New pipe or feet added.	Service mains	.....	.....	6,742	500	.....	795	.....	.....	.....	.....	8,037
	Supply main connections	.....	.....	.....	.....	.....	.....	.....	98	.....	.....	98
	Service supply connections	.....	108	.....	.....	.....	.....	.....	.....	.....	.....	108
	Fire hydrant connections	.....	.....	753	.....	.....	.....	.....	.....	.....	.....	753
	Fire connections (private)	.....	.....	13	.....	.....	.....	.....	.....	.....	.....	13
	Supply connections (private)	13	.....	694	.....	.....	.....	.....	.....	.....	.....	707
	Drains	.....	.....	14	.....	.....	.....	.....	.....	.....	.....	14
	Total.... Feet	13	108	8,216	500	.....	795	.....	98	.....	.....	9,730
	Total.... Pounds	195	2,052	271,128	21,000	.....	57,240	.....	32,536	.....	.....	384,151
Pipe used but adding nothing to feet in ground.	Pipe relaid	.....	.....	2,934	.....	548	50	.....	.....	.....	.....	3,532
	Repairs, general	.....	19	365	25	35	25	12	8	12	12	513
	Pipe taken up	.....	2,930	519	50	.....	.....	.....	.....	.....	.....	3,499
	Pipe lowered	.....	.....	.....	.....	.....	.....	.....	.....	.....	417	417
	Pipe raised	.....	.....	.....	33	.....	.....	.....	.....	.....	.....	33
	Total.... Feet	.....	2,949	3,818	108	583	75	12	8	12	429	7,994
	Total.... Pounds	.....	56,031	125,994	4,536	32,065	5,400	1,320	2,656	5,064	250,965	484,031
Total handled	Feet	13	3,057	12,034	608	583	870	12	106	12	429	17,724
	Pounds	195	58,083	397,122	25,536	32,065	62,640	1,320	35,192	5,064	250,965	868,182
Pipe cut off and abandoned		.....	68	447	.....	.....	.....	.....	.....	.....	.....	515

Fifth District.

Comprising the Twenty-first and part of the Thirty-eighth Wards.

	Purposes for which used.	Size in Inches.										Total in Feet and Pounds.
		3	4	6	8	10	12	20	30	36	48	
New pipe or feet added.	Service mains	.....	.....	4,246	.....	.....	1,965	.....	.....	.....	.....	6,211
	Supply mains	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,676	2,676
	Pumping mains	.....	.....	.....	.....	.....	366	.....	.....	.....	.....	366
	Service main connections	.....	.....	60	.....	.....	.....	.....	.....	.....	.....	60
	Supply main connections	.....	.....	.....	.....	18	.....	.....	.....	.....	.....	18
	Pumping main connections	.....	.....	.....	.....	.....	.....	20	.....	.....	.....	20
	Bye-pass connections	.....	.....	32	.....	.....	.....	.....	.....	.....	.....	32
	Fire hydrant connections	.....	.....	245	.....	.....	.....	.....	.....	.....	.....	245
	Fire connections (private)	.....	17	69	.....	.....	.....	.....	.....	.....	.....	86
	Supply connections (private)	13	150	4	.....	.....	.....	.....	.....	.....	.....	167
	Drains	.....	56	740	43	84	.....	.....	.....	.....	.....	923
	Total — Feet	13	223	5,396	43	102	2,331	20	.....	.....	2,676	10,804
	Total — Pounds	195	4,237	178,068	1,806	5,610	167,832	3,180	.....	.....	1,565,460	1,926,388
Pipe used, but adding nothing to feet in ground.	Pipe relaid	.....	.....	122	.....	.....	.....	93	101	267	.....	583
	Repairs general	.....	36	626	.....	4	42	14	76	.....	97	895
	Pipe taken up	.....	79	157	.....	.....	.....	86	289	358	.....	969
	Pipe lowered	.....	.....	511	.....	.....	.....	.....	.....	.....	.....	511
	Total — Feet	.....	115	1,416	.....	4	42	193	466	625	97	2,958
	Total — Pounds	.....	2,185	46,728	.....	220	3,024	30,687	154,712	263,750	56,745	558,051
	Total handled — Feet	13	338	6,812	43	106	2,373	213	466	625	2,773	13,762
	Total handled — Pounds	195	6,422	224,796	1,806	5,830	170,856	33,867	154,712	263,750	1,622,205	2,484,439
	Pipe cut off and abandoned	.....	.....	31	.....	.....	.....	.....	.....	.....	.....	31

Sixth District.

Comprising part of 22d, 33d, 37th and 38th Wards.

	Purposes for which Used.	Size in Inches.						Total in Feet and Pounds.
		4	6	10	12	20	30	
New Pipe or Feet Added.	Service mains	.....	16,789	.....	3,795	.....	.....	20,584
	Service supply connections	20	.....	.....	.....	.....	.....	20
	Fire hydrant connections	.....	1,213	.....	.....	.....	.....	1,213
	Fire connections (private)	37	9	.....	.....	.....	.....	46
	Supply connections (private)	18	19	.....	.....	.....	.....	37
	Motor connections (private)	32	.....	.....	.....	.....	.....	32
	Total Feet	107	18,030	.....	3,795	.....	.....	21,932
	Total Pounds	2,033	594,990	.....	273,240	.....	.....	870,263
Pipe used, but adding nothing to feet in ground.	Pipe relaid	.....	431	.....	.....	.....	.....	431
	Repairs general	24	1,200	30	1,552	4	2	2,812
	Pipe taken up	66	51	.....	.....	.....	.....	117
	Pipe lowered	.....	423	.....	.....	.....	.....	423
	Total Feet	90	2,105	30	1,552	4	2	3,783
	Total Pounds	1,710	69,465	1,650	111,744	636	664	185,869
	Total handled Feet	197	20,135	30	5,347	4	2	25,715
	Total handled Pounds	3,743	664,455	1,650	384,984	636	664	1,056,132
	Pipe cut off and abandoned	111	432	.....	.....	.....	.....	543

Seventh District.

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

	Purposes for which used.	Size in Inches. 3	4	6	8	10	12	16	20	30	36	48	Total in feet and pounds.
New pipe or feet added.	Service mains	.....	.....	18,901	633	4,754	1,731	.....	.....	.....	.....	.....	26,019
	Supply mains	.....	.....	.....	.....	.....	.....	80	.....	.....	.....	.....	80
	Pumping mains	.....	.....	.....	.....	.....	.....	.....	.....	162	485	48	695
	Service main connections	.....	.....	.....	.....	9	.....	.....	.....	.....	.....	.....	9
	Supply main connections	.....	.....	.....	.....	16	.....	.....	.....	.....	.....	.....	16
	Fire hydrant connections	.....	.....	1,167	.....	.....	.....	.....	.....	.....	.....	.....	1,167
	Supply connections (private)	44	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	57
	Drains	.....	.....	14	75	.....	.....	.....	.....	.....	.....	.....	89
	Total — Feet	44	13	20,082	708	4,779	1,731	80	.....	162	485	48	28,132
	Total — Pounds	660	247	662,706	29,736	262,845	124,632	8,800	.....	53,784	204,670	28,080	1,376,160
Pipe used, but adding nothing to feet in ground.	Pipe relaid	.....	.....	436	40	220	1,805	.....	.....	.....	.....	.....	2,501
	Repairs, general	.....	4	270	53	15	20	.....	.....	99	17	.....	478
	Pipe taken up	.....	158	387	.....	.....	60	.....	.....	.....	.....	.....	605
	Pipe lowered	.....	.....	271	180	.....	.....	.....	.....	.....	.....	.....	451
	Pipe raised	.....	.....	12	502	.....	.....	.....	.....	.....	.....	.....	514
	Pipe shifted	.....	.....	.....	.....	.....	.....	.....	85	76	.....	.....	161
	Total — Feet	.....	162	1,376	775	235	1,885	.....	85	175	17	.....	4,710
	Total — Pounds	.....	3,078	45,408	32,550	12,925	135,720	.....	13,515	58,100	7,174	.....	308,470
	Total handled — Feet	44	175	21,458	1,483	5,014	3,616	80	85	337	502	48	32,842
	Total handled — Pounds	660	3,325	708,114	62,286	275,770	260,352	8,800	13,515	111,884	211,844	28,080	1,684,630
Pipe cut off and abandoned		.....	150	439	.....	.....	1,745	.....	.....	.....	.....	.....	2,334

Total Feet of Pipe in Use December 31, 1901.

Size in Inches.	Total in use Dec. 31, 1900.	Extension and Relays during 1901.			Deductions during 1901.			Total in use Dec. 31, 1901.
		Laid.	Relaid.	Total.	Taken up.	Abandoned.	Total.	
1	175	.....	.....	.....	.....	.....	.....	175
1½	3,566	.....	.....	.....	.....	.....	.....	3,566
2	3,855	.....	.....	.....	.....	.....	.....	3,855
3	82,451	254	.....	254	216	234	450	82,255
4	210,650	666	.....	666	10,270	1,804	12,074	199,242
6	4,853,191	90,544	14,640	105,184	2,607	1,478	4,085	4,954,290
8	240,266	3,697	161	3,858	126	26	152	243,972
10	409,542	7,074	3,546	10,620	18	1,745	1,763	418,399
12	417,551	16,398	1,855	18,253	60	.....	60	435,744
16	122,167	137	.....	137	.....	.....	.....	122,304
18	16,085	.....	.....	.....	.....	.....	.....	16,085
20	227,852	858	93	951	86	.....	86	228,717
22	606	.....	.....	.....	.....	.....	.....	606
23	27	.....	.....	.....	.....	.....	.....	27
24	2,696	.....	.....	.....	.....	.....	.....	2,696
30	233,249	305	232	537	477	.....	477	233,309
36	81,628	1,894	267	2,161	358	.....	358	83,431
48	161,369	7,528	.....	7,528	.....	.....	.....	168,897
Total	7,066,926	129,355	20,794	150,149	14,218	5,287	19,505	7,197,570

		30	36	48	Total in feet and pounds.
New pipe or feet added.	Service ma	.....	.....	.....	108,692
	Supply ma	45	1,096	7,480	8,701
	Pumping r	162	736	42	2,298
	Service ma	.....	.....	.....	69
	Supply ma	98	.....	.....	132
	Pumping r	.....	62	.....	181
	Bye-pass c	.....	.....	.....	181
	Service su	.....	.....	.....	128
	Fire hydra	.....	.....	.....	5,840
	Fire conn	.....	.....	.....	441
	Supply co	.....	.....	.....	1,346
	Motor con	.....	.....	.....	32
	Supply co	.....	.....	.....	13
	Drains...	.....	.....	.....	1.301
		305	1,894	7,528	129,355
	To	101,260	799,268	4,403,880	10,185,316
Pipe used but adding nothing to feet in ground.	Pipe rel	232	267	.....	20,794
	Repairs	200	29	109	6,240
	Pipe ta	477	358	.....	14,218
	Pipe lo	640	.....	417	3,040
	Pipe ra	.....	.....	.....	547
	Pipe sh	76	.....	.....	1,416
		1,625	654	526	46,255
		539,500	275,988	307,710	2,682,785
	Total han	1,930	2,548	8,054	175,610
		640,760	1,075,256	4,711,590	12,868,101
	Pipe cut off	.....	.....	.....	5,287

BROKEN MAINS.

Breaks for which no Special Reason could be assigned occurred in the following-named mains:

Districts.	Size in Inches.										Total.
	3	4	6	8	10	12	16	30	36	48	
First	....	....	2	....	....	....	....	1	....	....	3
Second	3	10	24	1	....	....	....	....	....	....	38
Third	....	....	5	....	....	....	....	....	....	....	5
Fourth	....	1	32	....	1	3	1	....	1	1	40
Fifth	....	....	....	....	....	....	....	....	....	....	....
Sixth	....	....	6	...	....	3	1	1	....	....	11
Seventh	....	....	4	1	....	....	....	....	....	....	5
Total	3	11	73	2	1	6	2	2	1	1	102

The following-named breaks were caused by sewer contractors and street cleaners in their rough usage of fire hydrants, and by water freezing in the pipes, and various other causes:

Districts.	Size in Inches.								Total.
	4	6	8	10	12	20	30	48	
First	....	2	....	1	....	...	....	....	3
Second	1	7	2	....	....	....	....	....	10
Third	4	6	....	....	....	....	....	....	10
Fourth	3	7	....	....	....	....	....	....	10
Fifth	4	18	....	1	2	1	4	4	34
Sixth	....	4	....	1	1	2	....	....	8
Seventh	....	....	....	....	....	....	....	....	....
Total	12	44	2	3	3	3	4	4	75

Recapitulation of Fire Hydrants Set, Renewed and Removed.

	Districts.	Style.				Total.
		O. S.	No. 1.	No. 2.	No. 3.	
Set:	First	.....	34	.....	.....	34
	Second	.....	9	7	.....	16
	Third	.....	141	8	.....	149
	Fourth	.....	37	24	.....	61
	Fifth	.....	22	.....	.....	22
	Sixth	.....	86	.....	.....	86
	Seventh	.....	62	13	.....	75
	Total	.....	391	52	.....	443
Renewed:	First	.....	10	.....	.....	10
	Second	.....	17	18	.....	35
	Third	.....	8	2	.....	10
	Fourth	.....	2	1	.....	3
	Fifth	.....	36	.....	.....	36
	Sixth	.....	130	.....	.....	130
	Seventh	.....	26	21	.....	47
	Total	.....	229	42	.....	271
	Total new fire hydrants	.....	620	94	.....	714
Removed.	First	1	.....	3	.....	4
	Second	1	3	4	1	9
	Third	.....	7	2	1	10
	Fourth	6	2	2	3	13
	Fifth	.....	4	1	.....	5
	Sixth	3	2	4	1	10
	Seventh	9	1	2	.....	12
	Total	20	19	18	6	63
	Total added during 1901	.....	.....	.....	.....	330

Fire Hydrants by Wards.

Wards.	Style.						Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	
First	3	200	67	8	.....	.....	278
Second	3	119	91	15	.....	.....	228
Third	3	75	43	6	.....	.....	127
Fourth	1	63	32	14	.....	.....	110
Fifth	18	101	58	8	.....	.....	185
Sixth	8	78	47	8	.....	.....	141
Seventh	7	139	85	7	.....	1	239
Eighth	11	111	98	6	.....	1	227
Ninth	.....	124	77	4	.....	1	206
Tenth	.....	108	69	1	.....	4	182
Eleventh	4	75	26	1	.....	.....	106
Twelfth	7	61	28	5	.....	.....	101
Thirteenth	29	58	68	9	.....	.....	164
Fourteenth	.....	85	88	.....	.....	.....	173
Fifteenth	.....	232	208	6	1	2	449
Sixteenth	2	83	39	2	1	.....	127
Seventeenth	12	80	33	.....	.....	.....	125
Eighteenth	13	166	62	5	.....	.....	246
Nineteenth	32	322	122	.....	.....	.....	476
Twentieth	20	131	132	.....	.....	.....	283
Twenty-first	75	284	61	3	.....	.....	423
Twenty-second	72	1,155	173	18	.....	.....	1,418
Twenty-third	38	303	77	1	.....	.....	419
Twenty-fourth	56	269	151	14	.....	.....	490
Twenty-fifth	8	484	132	.....	.....	.....	624
Twenty-sixth	1	217	123	14	.....	.....	355
Twenty-seventh	32	306	94	5	.....	1	438
Twenty-eighth	1	145	131	20	.....	.....	297
Twenty-ninth	22	193	193	11	.....	1	420
Thirtieth	5	115	110	6	.....	.....	236
Thirty-first	.....	222	69	6	.....	.....	297
Thirty-second	10	124	92	10	.....	1	237

Fire Hydrants by Wards—Continued.

Wards.	Style.						Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	
Thirty-third	24	604	173	14	1	.....	816
Thirty-fourth	29	462	77	11	.....	1	580
Thirty-fifth	.....	90	9	.....	.....	.....	99
Thirty-sixth	7	270	100	29	.....	.....	406
Thirty-seventh	5	91	79	6	.....	.....	181
Thirty-eighth	17	361	98	7	.....	.....	483
Thirty-ninth	.....	203	90	7	.....	.....	300
Fortieth	7	195	43	2	.....	.....	247
Forty-first	.....	54	7	.....	.....	.....	61
Total	582	8,558	3,555	289	3	13	13,000

STATEMENT OF THE NUMBER OF FIR

	First District.									Second						
	Wards.								Total.	Ward						
	1	2	3	4	26	30	36	39		5	6	7	8	9	10	11
Prior to 1901									2,051							
During 1901	2	1	1	1	5	2	17	5	34		5		1	3		
Total									2,085							
Taken out, 1901		1				2	1		4		3	1		2		
Total in City									2,081							

Number of attachment

ade during 1901.....

Total.....

Fire Hydrants by Purveyors' Districts.

Districts.	Style.						Total.
	O. S.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	
First	20	1,272	687	102	.....	.....	2,081
Second	92	1,111	714	54	1	7	1,979
Third	117	2,155	619	21	1	.....	2,913
Fourth	65	982	865	44	1	4	1,961
Fifth	77	368	63	4	.....	.....	512
Sixth	87	1,438	242	32	.....	.....	1,799
Seventh	124	1,232	365	32	.....	2	1,755
Total	582	8,558	3,555	289	3	13	13,000

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

Districts.	NEW ATTACHMENTS.											SHUT OFF BY PERMIT.							WORK DONE WITHOUT PERMIT.					
	Size.															Repairs.			Drawn.					
	½-inch.	⅝-inch.	¾-inch.	1-inch.	1¼-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Reamed for Larger Attachments.	Re-driven.	Discontinued.	Transfer.	Not Drawn.	Drawn and Re-driven.	Total.	Discontinued and abandoned.	Duplicate.	Delinquent.	Leak.	Total.	Drawn and Redriven.
First	527	36	15	12	....	8	4	2	2	1	607	.....	171	35	2	....	20	228	14	....	.....	151	165	
Second	231	34	39	39	8	8	12	....	....	....	371	72	63	293	2	13	85	528	43	....	1	88	132	159
Third	1,352	23	18	16	4	10	26	1	5	....	1,455	.....	12	50	1	....	85	148	102	8	.....	176	286	434
Fourth	499	31	9	13	8	8	1	1	....	....	570	23	72	.....	.....	28	84	207	22	....	.....	142	164	146
Fifth	132	2	6	9	....	5	16	....	....	....	170	.....	6	28	2	17	21	74	3	....	.....	.....	3	20
Sixth.....	476	81	16	11	2	2	7	....	3	2	600	11	56	40	1	3	4	115	1	....	.....	.....	1	
Seventh.....	1,274	66	12	6	1	....	12	....	....	....	1,371	9	27	25	3	....	32	96	1	1	1	40	43	
Total....	4,491	273	115	106	23	41	78	4	10	3	5,144	115	407	471	11	61	331	1,396	186	9	2	597	794	759

Permits Issued during the year 1901.

Aquaria	4	Lawn sprinklers	10
Bakeries	41	Laundries	101
Barber shops	174	Laboratories	2
Bars	34	Machines for scouring, rinsing, etc	43
Basins and sinks in dwellings	5,942	Milk houses	62
Basins and sinks in offices and stores	1,741	Motors, beer	63
Baths in dwellings	6,248	Motors, organ	16
Baths in hotels, etc	35	Photograph galleries	7
Baths shower	24	Pantry sinks	893
Bidets	6	Pools swimming	4
Boats, etc., supply of	142	Pools in churches	6
Bottling establishments	19	Restaurants and eating saloons	78
Building purposes	326	Slaughter houses	3
Carriages and wagons	371	Stables	106
Cellar drainers	7	Stalls in stables	1,819
Dwellings	3,453	Stalls, cow	32
Dwellings, half	231	Steam boilers, number	191
Drug stores	39	Steam boilers, horse power	9,626
Dye houses	4	Steam engines, number	128
Factories	18	Steam engines, horse power	1,383
Ferrules, number	5,267	Street sprinklers	91
Filters	6	Tubs, vats and tanks	86
Fire hydrants, use of	191	Urinal in dwellings	24
Fish troughs and stands	7	Urinals in stores, offices, etc	203
Forges	18	Urinals troughs	81
Fountains, counters	27	Wash pave and screw nozzles	2,484
Fountains, garden	11	Wash paves, for watering horses	44
Green houses	56	Wash tubs, stationary	3,562
Heating boilers	126	Water closets in dwellings	16,845
Hydrants in new buildings	4,141	Water closets in stores, etc	1,146
Hydraulic elevators	21		
Ice cream saloons	19		

Premises Supplied and Appliances in Use January 1, 1902.

Aquaria	12	Factories, foundries, and mills	1,972
Arsenals	2	Filters	19
Asylums	7	Fire stations	49
Bakeries	1,097	Fountains, garden	43
Barber shops	1,736	Fountains, counter	516
Bars	1,739	Forges	1,142
Basins and sinks in dwellings	74,813	Furnaces	28
Basins and sinks in offices and stores	28,901	Gas works and holders	9
Baths in dwellings	277,439	Glass works	13
Baths, public	1,304	Green houses	1,062
Baths, shower	271	Grindstones	146
Baths, foot	114	Halls and club houses	214
Beam houses and tanneries	28	Hatters' planks, per set	16
Bidets	441	Hydrants	251,420
Bottling establishments	643	Hospitals	49
Brickyards	16	Hotels	59
Brickyards, gangs of men	74	Hydraulic elevators	243
Breweries	93	Ice cream saloons	312
Barrels brewed	2,351,432	Institutions, charitable	91
Cars, steam and electric	1,462	Ice machines	156
Carriages and wagons	9,108	Laundries	774
Cellar drainers	41	Lawn sprinklers	271
Cemeteries	23	Laboratories	36
Churches	518	Machines for washing, scouring, etc	2,721
Coal yards	238	Marble yards	76
Coloring rooms	166	Malt houses	16
Condensers	15	Market houses	77
Depots and railroad stations	103	Milk houses	361
Dwellings with water	240,168	Mints	2
Dwellings without water	2,912	Motors, beer	1,797
Dwellings half without water	9,581	Motors, organ	135
Dyers	742	Photograph galleries	131
Drug stores	373	Photograph galleries, operators	170
Dye houses	636	Police stations and patrols	49
Engines on railroads	334		

Premises Supplied and Appliances in Use—Continued.

Polishing wheels	23	Steam engines, number	2,074
Pools, swimming	25	Steam engines, horse-power	34,146
Pools in churches	84	Steam saws	61
Printing establishments	176	Steam presses and hammers	66
Prisons	4	Shops and stores with water	5,834
Rectifying establishments	8	Shops without water	941
Restaurants and oyster saloons	1,102	Schoolhouses	341
Shot tower	1	Theatres	19
Slaughter-houses	458	Tubs, vats and tanks	2,212
Soap-boiling establishments	18	Turbine wheels	38
Standpipes for watering engines	36	Urinals in dwellings	226
Stables	7,658	Urinals in stores, offices, etc.	4,641
Stalls in stables	51,416	Urinal troughs	672
Stalls, cow	171	Vinegar establishments	10
Stalls, fish and trough	97	Wash paves and screw nozzles	95,842
Steam boilers, number	3,592	Wash paves for watering horses	641
Steam boilers, horse-power	121,781	Washtubs, stationary	33,022
Steam boilers, heating	892	Water closets in dwellings	223,628
Steam boilers, heating, horse-power	5,661	Water closets in stores, etc.	26,703
		Wool washers	101

TABLE "A."

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

Districts.	Number of Connections.			Total.	Length in Feet.			Total.
	¾-inch.	⅝-inch.	1-inch.		¾-inch.	⅝-inch.	1-inch.	
First	415	1	....	416	5,496	15	....	5,511
Second	.....	....	....	.....	.....	.....	....	.....
Third	1,690	....	1	1,691	25,074	.....	15	25,089
Fourth	408	....	....	408	5,367	.....	....	5,367
Fifth	67	....	....	67	884	.....	....	884
Sixth	239	44	2	285	3,698	773	10	4,481
Seventh	1,182	8	....	1,190	22,668	192	....	22,860
Total	4,001	53	3	4,057	63,187	980	25	64,192

Account of Iron Stop Boxes, New Stops and Check Valves for 1901.

Districts.	Iron Stop Boxes.	Stops.						Check Valves.	Total.
		Bureau of Water.		Viney.		Ludlow.	Smith's Patent.		
		2-way.	B. F.	3-way.	4-way.				
First	40	60	.....	.....	.....	.....	4	.....	64
Second	54	47	.....	.....	.....	.....	12	.....	59
Third	14	275	7	.....	.....	.....	9	1	292
Fourth	156	58	.....	2	.....	.....	10	.....	70
Fifth	.....	51	4	.....	1	.....	3	1	60
Sixth	38	120	.....	.....	.....	.....	1	.....	121
Seventh	68	189	.....	.....	.....	3	3	3	198
Total	370	800	11	2	1	3	42	5	864

Repairs to Mains, Stops, and Fire Hydrants, also Stops and Fire Hydrants Removed during 1901.

Districts.	Repairs to Mains.	Stops.			Fire Hydrants.		
		Repaired	Renewed.	Removed.	Repaired.	Renewed.	Removed.
First	27	73	16	.....	169	10	4
Second	132	286	15	7	131	35	9
Third	140	195	56	3	193	10	10
Fourth	360	511	1	6	524	3	13
Fifth	42	19	12	3	33	36	5
Sixth	80	10	12	2	10	130	10
Seventh	107	240	27	7	65	47	12
Total	888	1,334	139	28	1,125	271	63

Check Valves Put In.

	Location.	Ward.	Size.
Belmont Pumping Station.	2 ft. 6 in. E. of E. wall and 19 ft. N. of S. wall of Engine House	24	30
Belmont Pumping Station.	2 ft. 6 in. E. of E. wall and 43 ft. N. of S. wall of Engine House	24	30
Belmont Pumping Station.	2 ft. 6 in. E. of E. wall and 56 ft. N. of S. wall of Engine House	24	30
Frankford Pumping Stat'n.	26 ft. N. E. of N. E. house line and 39 ft. S. E. of N. W. house line of Suburban Electric Light Co.'s Power House	41	36
Roxborough Auxiliary Pumping Station	2 ft. S. W. of S. W. wall and 36 ft. N. W. of S. E. wall of Engine House	21	30

Total Number of Stops and Valves Arranged by Districts.

Pattern.	Size.	Outlets.	Districts. 1st.	2d.	3d.	4th.	5th.	6th.	7th.	Total.
Single Gate. Bureau of Water.	3	2-way.	1	185	4	15	2	12	12	231
	4	2-way.	94	248	49	153	45	95	73	757
	6	2-way.	3,640	2,515	4,007	3,035	651	2,323	2,832	19,003
	8	2-way.	143	115	115	96	7	71	274	821
	10	2-way.	215	332	203	226	28	161	177	1,342
	12	2-way.	102	184	293	144	51	200	207	1,181
	16	2-way.	38	43	45	20	2	39	19	205
	18	2-way.	.....	.....	5	.....	.....	1	.....	6
	20	2-way.	24	35	19	37	14	16	24	169
	30	2-way.	8	9	29	37	12	3	4	102
	36	2-way.	3	1	9	12	11	.....	6	42
	48	2-way.	.....	.....	3	9	.....	.....	.....	12
	Totals....		4,268	3,667	4,781	3,783	823	2,921	3,628	23,871
Butterfly. Bureau of Water.	20	2-way.	.....	1	5	8	3	2	5	24
	30	2-way.	2	2	6	7	9	1	5	32
	36	2-way.	.....	.....	4	17	1	.....	.....	22
	48	2-way.	.....	1	7	27	22	.....	.....	57
	Totals....		2	4	22	59	35	3	10	135
Barton.	6	4-way.	4	16	.....	12	.....	.....	.....	32
	8	4-way.	.....	.....	.....	5	.....	.....	.....	5
	6	5-way.	12	24	.....	.....	.....	.....	8	44
	6	6-way.	.....	6	.....	.....	.....	.....	1	7
	Totals....		16	46	.....	17	.....	.....	9	88

Total Number of Stops, Valves, etc.—Continued.

Pattern.	Size.	Outlets.	Districts. 1st.	2d.	3d.	4th.	5th.	6th.	7th.	Total.
Viney.	6	2-way.	5	.....	4	3	.....	.....	.....	12
	6	3-way.	51	59	31	232	5	10	21	409
	8	3-way.	.....	.....	.....	.....	.....	.....	5	5
	10	3-way.	.....	.....	.....	3	.....	.....	.....	3
	12	3-way.	.....	1	.....	3	.....	.....	1	5
	6	4-way.	24	29	22	104	4	11	25	219
	8	4-way.	1	.....	2	.....	.....	.....	5	8
	10	4-way.	.....	.....	.....	14	.....	.....	4	18
	12	4-way.	.....	.....	.....	.....	.....	2	.....	2
	6	5-way.	25	5	2	26	.....	.....	3	1
	Totals....		106	94	61	385	9	23	64	742
Smith Patent.	3	2-way.	1	20	.....	1	.....	.....	7	29
	4	2-way.	3	17	2	.....	.....	.....	4	26
	6	2-way.	1	32	19	13	8	6	15	94
	8	2-way.	1	.....	8	.....	.....	.....	.....	9
	10	2-way.	.....	.....	7	.....	1	1	1	10
	12	2-way.	1	3	8	.....	.....	.....	.....	12
	16	2-way.	4	.....	2	.....	.....	.....	.....	6
	20	2-way.	.....	1	1	.....	.....	.....	2	4
	Totals....		11	73	47	14	9	7	29	190
Ludlow.	3	2-way.	.....	.....	.....	.....	.....	.....	1	1
	30	2-way.	.....	.....	.....	.....	.....	.....	3	3
	Totals....		.....	.....	.....	.....	.....	.....	4	4
Total number of stops.....			4,403	3,884	4,911	4,258	876	2,954	3,744	25,030
Check Valves, Bureau of Water.	20	.....	.....	.....	.....	.....	.....	.....	1	1
	30	.....	.....	.....	1	.....	4	.....	3	8
	36	.....	.....	.....	1	.....	4	.....	1	6
	48	.....	.....	.....	4	4	6	.....	.....	14
	Totals....		.....	.....	6	4	14	.....	5	29

Number of Valves raised in the several Districts during the Year 1901.

Districts.	Barton.			Viney.			Single Gate.						Total.
	4-way.	5-way.	6-way.	3-way.	4-way.	5-way.	3-inch.	6-inch.	8-inch.	10-inch.	16-inch.	20-inch.	
First	....	....	....	....	....	....	....	3	3	1	1	....	8
Second	1	1	1	5	6	1	1	7	1	2	1	1	28
Fourth	1	....	....	4	....	....	....	12	....	....	....	....	17
Total	2	1	1	9	6	1	1	22	4	3	2	1	53

Number of Complaints and Examinations during 1900 and 1901.

Months.	Hydrants.		Service Pipes.		Wash Paves.		Spigots.		Water Closets.		Horse Troughs.		No Leaks.		Total.	
	1900.	1901.	1900.	1901.	1900.	1901.	1900.	1901.	1900.	1901.	1900.	1901.	1900.	1901.	1900.	1901.
January	251	186	227	148	13	1	7	12	79	76	2	2	19	9	598	434
February	146	288	166	179	11	21	5	3	56	89	.....	1	22	13	406	604
March	94	170	121	130	3	5	8	8	55	66	3	.....	6	9	290	388
April	150	116	120	97	3	10	9	8	83	66	2	.....	10	14	377	311
May	159	187	104	90	6	2	15	15	92	56	3	2	12	12	391	364
June	188	244	96	137	4	6	13	7	89	66	1	.....	14	13	405	473
July	172	116	109	71	10	1	7	1	66	33	1	3	7	.....	372	225
August	157	100	79	61	3	2	21	2	72	30	1	2	4	5	337	202
September	158	169	86	121	3	3	9	6	63	31	.....	.....	11	13	330	343
October	265	163	123	175	7	5	17	22	109	52	2	2	11	19	531	438
November	238	181	95	108	1	14	17	7	94	38	1	1	17	10	463	359
December	229	148	143	222	9	9	12	15	83	49	4	1	13	15	493	459
Total	2,207	2,068	1,469	1,539	73	79	140	116	941	652	20	14	146	132	4,996	4,600

NEW METERS SET.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic Feet Consumed.	Remarks.
1	Henry Goldner & Son	Southwest cor. Ash and Tasker streets....	Boiler makers.....	June 19..	Union ..	....	....	....	....	1	....	....	....	....	1	45,300	
2	M. Lussman.....	935-39 South Fourth street.....	Bath house.....	July 19..	Trident.	....	....	1	....	....	....	....	....	....	1	6,700	
3	Anna W. Scholey....	113-15 Queen street.....	Miscellaneous.....	April 23..	Crown ..	....	....	....	1	....	....	....	....	....	1	39,000	
4	Southwest'n Nat. B'k	S. E. cor. Broad and South streets.....	Bank.....	Nov. 29..	Crown..	....	....	....	1	....	....	....	....	....	1	300	
5	Royal Insurance Co.	306 Walnut street.....	Offices.....	Jan. 12..	Crown..	....	....	1	....	....	....	....	....	....	1	69,500	
5	Royal Insurance Co.	212-14 South Third street.....	Offices and boilers...	Jan. 12..	Stand'd.	....	....	....	....	1	....	....	....	....	1	35,800	
5	John P. Murphy.....	227 South Fifth street.....	Printing house.....	Jan. 15..	Crown..	....	....	....	1	....	....	....	....	....	1	9,800	
5	Lewis A. Thompson.	231-33 South American street.....	Furniture	April 23..	Crown..	....	....	....	1	....	....	....	....	....	1	40,500	
5	Merchants' & Miners' Trans. Co.....	Pier 24 South Delaware avenue.....	Shipping.....	May 3..	Gem....	....	....	....	....	....	....	1	....	....	1	212,300	
5	David M. Ellis.....	S. E. cor. American and Chancellor sts....	Printing, etc.....	June 29	Gem....	....	....	....	....	....	1	....	....	....	1	98,600	
5	Forrest Building.....	109-29 South Fourth street.....	Office building.....	July 15..	Union..	....	....	....	....	1	....	....	....	....	1	138,100	
5	Forrest Building.....	109-29 South Fourth street.....	Office building.....	July 16..	Union..	....	....	1	....	....	....	....	....	....	1	70,000	
5	Forrest Building.....	109-29 South Fourth street.....	Office building.....	July 17..	Union ..	....	....	1	....	....	....	....	....	....	1	8,000	
5	Girard Estate.....	N. side Harmony st., 30 ft. E. Hudson st.	Offices.....	Aug. 26..	Gem....	....	....	....	....	....	....	....	1	....	1	357,400	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size.									Total.	Cubic Feet Consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
5	J. B. Lippincott Co..	N. E. cor. Sixth and Locust streets.....	Printing office.....	Sept. 25..	Gem....	....	....	....	....	....	....	1	....	....	1	37,900	
5	T. L. Beall & Co.....	119-21 Le Lancey street.....	Flour and feed.....	Oct. 24..	Union..	....	....	1	....	....	....	....	....	....	1	1,000	
6	Phoenix Paint & Varnish Co.....	218 N. Second street.....	Paint manufacturers.	April 5..	Gem....	....	....	....	....	....	1	....	....	....	1	33,600	
6	James Smith & Co...	411-21 Race street.....	Machinists.....	April 27..	Crown..	....	....	....	1	....	....	....	....	....	1	117,200	
6	James Smith & Co....	411-21 Race street.....	Machinists.....	April 27..	Crown..	....	....	....	1	....	....	....	....	....	1	160,400	
6	Knickerbocker Ice Co	S. W. cor. Sixth and Arch streets.....	Offices.....	June 13..	Union..	....	....	....	....	1	....	....	....	....	1	43,100	
6	Knickerbocker Ice Co	S. W. cor. Sixth and Arch streets.....	Offices	Jan 14...	Union .	....	....	....	....	1	....	....	....	....	1	37,200	
6	John E. Lonergan....	211-15 Race street.....	Machinists	Sept. 6...	Union .	....	....	1	....	....	....	....	....	....	1	16,600	
6	G. A. Bisler.....	249-55 N. Sixth street.....	Paper Boxes	Sept. 20...	Crown .	....	....	....	....	....	1	....	....	....	1	65,700	
7	De Lancey School ...	1420 Pine street.....	Private School.....	April 17...	Gem ...	....	....	....	....	....	....	1	....	....	1	74,900	
8	W. J. Gilmore.....	803 Walnut street	Saloon	May 3...	Crown .	..	....	....	1	....	....	....	....	....	1	8,500	
8	Petzelt & Keyser.....	229 S. Twenty-fourth street.....	Wagon Builders	May 10...	Crown .	....	....	1	....	....	....	....	....	....	1	5,200	
8	Charles H. Pile.....	719-21 Spruce street.....	Apartment House ...	June 20...	Union .	....	....	1	....	....	....	....	....	....	1	300	
8	Charles H. Pile.....	719-21 Spruce street.....	Apartment House ...	June 21...	Crown .	....	....	1	....	....	....	....	....	....	1	65,700	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet Consumed.	Remarks.
8	Charles H. Pile.	719-21 Spruce street	Apartment House	June 24	Crown			1							1	5,700	
8	William Weightman.	N. S. Sansom street, W. of Juniper street.	Garrick Theatre	July 18	Gem								1		1	40,000	
8	Fidelity Trust Co.	N. E. cor. Broad and Sansom streets	Office Building	Sept. 12	Gem								1		1	907,100	
8	Fidelity Trust Co.	N. E. cor. Broad and Sansom streets	Office Building.	Sept. 17	Gem								1		1	1,027,000	
8	Samuel S. Childs.	706 Chestnut street	Dining Hall	Oct. 29	Crown					1					1	800	
8	F. Shannon	102 S. Thirteenth street	Hotel	Nov. 4	Crown				1						1	43,100	
9	Stacy Reeves	1611 Filbert street	Builders	Mar. 28	Crown					1					1	183,700	
9	Penn Mutual Ins. Co.	921-25 Chestnut street	Offices	April 24	Gem							1			1	261,800	
9	Penn'a R. R. Co.	1802-12 Filbert street	Repair Shops	May 3	Crown					1					1	74,900	
9	Childs Dining Hall Co	48 N. Eighth street	Dining Hall	May 7	Gem						1				1	8,500	
9	Henry H. Watkins	1031-33 Chestnut street	Office Building	June 5	Gem							1			1	287,700	
9	Masonic Temple	N. E. cor. Broad and Filbert streets	Lodge Room	July 5	Gem								1		1	286,600	
9	Quinn & Sharpless.	42 S. Sixteenth street	Milk depot	July 9	Union			1							1	85,400	
9	Quinn & Sharpless.	42 S. Sixteenth street	Milk depot	July 10	Crown				1						1	47,800	
9	Childs' Din'g Hall Co.	S. W. cor. Tenth and Market streets	Dining hall	July 25	Union					1					1	97,200	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size.									Total	Cubic Feet Consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
9	D. F. Levy	1416-18 S. Penn Square	Office building	Sept. 26	Crown	....	....	....	....	....	....	1	....	....	1	22,200	
9	Arcade Trust Co.	S. E. cor. Fifteenth and Market streets	Office building	Nov. 4	Gem	....	....	....	....	....	....	....	....	1	1	510	
10	Penn Electric Veh. Co	250-56 N. Broad street	Repair shop	Mar. 27	Crown	....	....	....	....	....	1	....	....	....	1	237,400	
10	Elliston P. Morris	715-19 Arch street	Store	April 18	Gem	....	....	....	....	....	....	1	....	....	1	109,500	
10	Coulter & Lowry	203-07 N. Twenty-second street	Finishing works	June 3	Gem	....	....	....	....	....	....	1	....	....	1	125,100	
10	D. W. Van Tine	1132-34 Race street	Offices, etc	June 22	Union	....	....	....	....	....	1	....	....	....	1	100,300	
10	D. W. Van Tine	141 47 N. Twelfth street	Printing, etc	Aug. 27	Union	....	....	....	....	1	....	....	....	....	1	....	No water used.
10	Strawbr'ge & Clothier	812-22 Race street	Stables	June 27	Gem	....	....	....	....	....	....	....	1	....	1	402,000	
10	P. & R. R. W. Co.	S. W. cor. Twenty-third and Cherry sts	Freight station	Aug. 27	Crown	....	....	....	1	....	....	....	....	....	1	300	
10	Thos. D. Moulds	148 N. Seventh street	Brass goods	Nov. 12	Crown	....	....	....	1	....	....	....	....	....	1	5,700	
10	City Penn S. F. & L. A.	Rear 248 N. Eighth st	Miscellaneous	Dec. 23	Crown	....	....	....	1	....	....	....	....	....	1	70	
11	Patrick & Diamond	409 N. Fourth st	Wholesale grocers	May 21	Crown	....	....	1	....	....	....	....	....	....	1	5,400	
11	Chas. J. Matthews	N. W. cor. American and Willow streets	Morocco	Aug. 3	Union	....	....	....	....	....	1	....	....	....	1	127,500	
11	Chas. J. Matthews	N. W. cor. American and Willow streets	Morocco	Aug. 24	Crown	....	....	....	....	....	1	....	....	....	1	100,100	
11	Chas. J. Matthews	N. W. cor. American and Willow streets	Morocco	Aug. 24	Crown	....	....	....	....	....	1	....	....	....	1	383,200	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size.									Total.	Cubic Feet Consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
11	Louis H. Frank, Ex'r.	213 Willow street	Morocco	Sept. 6	Crown			1							1	29,200	
11	Louis H. Wehmeyer	837 N. Second street	Brewers' supplies	Dec. 17	Crown			1							1	300	
13	Geo. A. Engwiler	442 North Ninth street	Dyer	Jan. 23	Crown				1						1	9,800	
13	Geo. A. Fletcher	701-09 Spring Garden street	Candy manufacturer	Nov. 27	Crown						1				1	84,600	
14	Est. of Thos. F. Kelly	S. W. cor. Tenth and Callowhill street	Theatre	Jan. 14	Crown					1					1	15,700	
14	Est. of Thos. F. Kelly	S. W. cor. Tenth and Callowhill street	Theatre	Jan. 16	Crown					1					1	63,700	
14	Park Theatre	N. E. cor. Broad and Fairmount ave	Theatre	May 27	Crown			1							1	29,800	
14	Tinius Olsen	500-02 North Twelfth street	Machinist	May 29	Pittsb'g					1					1	28,800	
14	Householder B. & L. Ass'n	813-19 North Eleventh street	Bottling estab	June 26	Union					1					1	21,900	
14	Householder B. & L. Ass'n	813-19 North Eleventh street	Bottling estab	June 28	Union			1							1	3,200	
15	Wm. Sellers & Co	N. S. Hamilton, 16th to 17th streets	Machinist	Feb. 8	Stand'd									1	1	48,300	
15	Vesper Barge Club	House No. 10 Fairmount Park	Club house	May 15	Crown			1							1	184,000	
15	Bergdoll Brg. Co.	N. E. cor. Twenty-ninth and Parrish sts.	Brewery	June 28	Gem							1			1	4,144,600	
15	Benj. Brooke	2314 Wood street	Soap manufacturer	Aug. 29	Trident							1			1	168,300	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date When Set.	Name of Meter.	Size.									Total.	Cubic Feet Consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
15	Thomas Spence	2533 Swain street	Dwelling	Oct. 1	Union	....	....	1	....	....	....	....	....	....	1	7,100	
16	Thomas Buckley	969-75 North Second street	Hub manufacturers	Mar. 22	Crown	....	....	....	....	....	1	....	....	....	1	70,500	
17	Rieger & Gretz	1531-38 Germantown avenue	Brewery	Feb. 14	Crown	....	....	1	....	....	....	....	....	....	1	1,700	
17	Philip Hauck	1227-31 North Fourth street	Paper boxes	May 27	Pittsb'g	....	....	....	....	1	....	....	....	....	1	61,900	
17	John Sidebottom	S. E. cor. Second and Oxford streets	Cotton mill	June 21	Union	....	....	....	....	....	1	....	....	....	1	71,100	
17	Rieger & Gretz	1531-38 Germantown avenue	Brewery	June 27	Union	....	....	....	....	....	1	....	....	....	1	142,800	
17	Wm. Heingartner	1228-32 Frankford avenue	Brewery	July 11	Union	....	....	1	....	....	....	....	....	....	1	1,300	
17	Rieger & Gretz	1531-38 Germantown avenue	Brewery	Aug. 20	Crown	....	....	....	....	1	....	....	....	....	1	75,300	
17	Standard Hosiery Co.	1310-20 Lawrence street	Hosiery mfrs	Oct. 31	Gem	....	....	....	....	....	1	....	....	....	1	54,200	
17	Tuttleman Bros. & Faggen	217 Jefferson street	Shirt mfrs	Nov. 25	Crown	....	....	....	....	....	....	....	1	....	1	14,200	
17	Tuttleman Bros. & Faggen	217 Jefferson street	Shirt mfrs	Nov. 26	Crown	....	....	....	1	....	....	....	....	....	1	20,300	
18	Penn'a R. R. Co.	N. E. cor. Laurel and Beach streets	Freight yard	April 5	Crown	....	....	....	1	....	....	....	....	....	1	320,100	
18	Charles W. Ervine	416-20 Memphis street	Boiler makers	May 1	Crown	....	....	1	....	....	....	....	....	....	1	25,900	
18	S. B. Vrooman	1133-41 Beach street	Lumber yd. & stable	June 10	Union	....	....	....	....	1	....	....	....	....	1	64,200	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date When Set.	Name of Meter.	Size.									Total.	Cubic Feet Consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
18	Bradlee & Co.....	S. W. cor. Beach and Susquehanna ave...	Chain mfrs.....	Oct. 4..	W'rth'n.	....	....	....	....	1	....	....	....	....	1	4,700	
19	Rex & Co.....	2229-33 N. American street.....	Storage house.....	Jan. 29..	Crown..	....	....	1	....	....	....	....	....	....	1	1,300	
19	Thos. Halton's Sons .	2627 Mutter street	Machinists.....	Mar. 15..	Crown..	....	....	....	....	1	....	....	....	....	1	79,900	
19	David Currie.....	W. S Lawrence st., S of Lehigh.....	Carpet mfrs.....	April 22..	Crown..	....	....	....	1	....	....	....	....	....	1	45,600	
19	C. & J. Sassman.....	1931-33 Hope street.....	Hosiery mfrs.....	April 26..	Crown..	....	....	1	....	....	....	....	....	....	1	9,700	
19	Ninth Presbyterian Church.....	S. W. cor. Hancock and Susquehanna ave.	Church.....	May 13..	Crown..	....	....	1	....	....	....	....	....	....	1	7,100	
19	Phila. & Trenton R. R. Co.....	N. E. cor. Front and Palmer streets.....	Freight depot.....	June 10..	Gem....	....	....	....	....	....	....	....	1	....	1	1,600	
19	Arrott S. P. Mills....	1720 N. Second street.....	Miscellaneous.....	June 17..	Union..	....	....	....	....	1	....	....	....	....	1	176,000	
19	Arrott S. P. Mills	1720 N. Second street.....	Miscellaneous.....	June 18..	Union..	....	....	....	....	1	....	....	....	....	1	253,600	
19	Louisa Fluehr, Ex'r..	2205-07 N. Front street.....	Furniture.....	June 24..	Union..	....	....	....	....	....	1	....	....	....	1	17,400	
19	Norris Market Ice Co	S. E. cor. Third and Norris streets.....	Ice mfrs.....	July 3..	Gem....	....	....	....	....	....	....	1	....	....	1	785,300	
19	James Buchanan	1710-12 N. Front street.....	Hosiery.....	Sept. 24..	Union..	....	....	....	....	1	....	....	....	....	1	3,600	
19	John S. Palmer & Son	1711 Randolph street	Box factory.....	Sept. 25..	Crown..	....	....	....	....	1	....	....	....	....	1	10,500	
19	T. Finkenauer.....	1715 N. Fifth street.....	Brewery.....	Oct. 25..	Gem....	....	....	....	....	....	....	1	....	....	1	54,800	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Sizes.								Total.	Cubic feet consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
19	T. Finkenaur	1715 N. Fifth street	Brewery	Oct. 28	Gem							1			1	26,600	
20	F. Bernzott	1232 N. Eleventh street	Saloon,	May 9	Crown				1						1	50,900	
20	Samuel W. Barnes	2104-6 N. Sixth street	Plumbers' Supplies	Nov. 7	Crown			1							1	2,400	
20	Mary M. Kelly	2102 N. Sixth street	Residence	Nov. 25	Crown			1							1	650	
21	A. & P. Roberts Co	3732 Main street	Offices	Jan. 25	Crown						1				1	211,900	
21	U. G. I. Co	E. S. Main st., 9th prop. N. of Ridge av.	Offices, etc	Jan. 28	Crown				1						1	73,000	
21	M. & J. Metzler	E. S. Gay street, 122 feet N. E. of Main	Laundry	Mar. 2	Crown						1				1	390,900	
21	A. & P. Roberts Co	E. S. Main street, 761 feet N. of Ridge av.	Restaurant	April 2	Crown			1							1	127,072	
21	Chas. Todd	4365 Main street	Drug Store	May 20	Crown			1							1	2,400	
21	Excelsior Stables Co.	110 Gay street	Livery Stable	Sept. 9	Union			1							1	10,700	
21	Jas. Dobson	School Lane and Reading Railway	Match Factory	Sept. 23	W'rth'n						1				1	17,900	
21	W. J. Robinson	6102 Ridge avenue	Plumbing, etc	Nov. 8	Crown			1							1	2,050	
22	Wm. G. Toplis	5249 Germantown avenue	Experimental	April 4	Crown	1									1	29,200	
22	Phila. Gtn. & C. H. R. R	N. S. Chelten ave., 200 feet W. of Pulaski	Station	April 8	Crown			1							1	132,500	
22	Tulpehoc'n Field Club	S. E. S. Johnson st., N. E. of Washington	Athletics	May 27	Nash			1							1	261	

New Meters Set—Continued.

Ward	Occupant.	Location.	Business.	Date when Set.	Name of Meter	Size. ½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic Feet Consumed.	Remarks.
22	Levi S. Full	5821-23 Germantown avenue	Cold Storage	June 4	Crown			1							1	3,900	
22	Century Leather Enamel Co	Chelten avenue and Anderson street	Tannery	June 4	Trident			1							1	6,400	
22	Germantown Ice and Distilled Water Co.	45 E. School street	Ice Manufacturers	June 6	Gem							1			1	921,700	
22	Wayne Ave. Bap. Ch.	N. E. cor. Wayne and Queen streets	Church	July 16	Union			1							1	280	
22	Bellfield Country Cl'b	Thorp's Lane and Stenton avenue	Athletics	Sept. 24	Stan'd						1				1	700	
22	Phila. & Reading Ry.	Wayne Station Stand Pipe	Station	Oct. 9	Stand'd									1	1	527,900	
22	W. H. Ball	59 East Washington lane	Residence	Nov. 18	Crown			1							1	1,200	
22	John E Flynn	N. E. c. Stenton avenue and Luray street.	Residence	Nov. 21	Crown			1							1	900	
22	Geo. B. Cock	216 West Coulter street	Residence	Dec. 4	Crown			1							1	27	
22	Wm. S. Twining	160 West Coulter street	Residence	Dec. 9	Crown			1							1		No water used.
22	Union Traction Co.	125 East Chelten avenue	Testing station	Dec. 9	Crown			1							1		No water used.
22	Est. H. H. Houston	Allen's lane and McCallum street	Milk depot	Dec. 17	Crown				1						1	400	
23	Wm. Norris	Trenton avenue, N. E. of Church street	Planing mill	Jan. 24	Crown						1				1	29,300	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size. ½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic Feet Consumed.	Remarks.
23	Wm. E. Dudley.....	S. E. cor. Unity and Leiper streets.....	Hosiery manufact'r..	Feb. 21..	Crown..	....	....	1	....	....	....	....	....	....	1	53,400	
23	A. L. Oat.....	S. E cor. Frankford ave. and Mill street..	Print works.....	April 30..	Crown..	....	....	....	....	1	....	....	....	....	1	169,800	
23	Phil & Trenton R.R.	S. W. c. Bridge street and Trenton R. R..	Freight yard	May 15..	Crown..	....	....	1	....	....	....	....	....	....	1	27,300	
23	Phil. & Trenton R.R.	S. E. cor. Pine street and Trenton R R....	Freight yard.....	May 15..	Crown..	....	....	1	....	....	....	....	....	....	1	127,500	
23	W. F. Kling.....	Tackawanna st, bet. Gillingham & Pear sts	Tapestry.....	May 31..	Trident.	....	....	1	....	....	....	....	....	....	1	3,000	
23	W F. Kling.....	Tackawanna st., bet Gillingham & Pear sts	Tapestry.....	June 3..	Trident.	....	....	....	1	....	....	....	....	....	1	11,300	
23	Greenwood & Bault..	4520 Worth street.....	Dyers.....	June 8..	Gem....	....	....	....	....	....	....	1	....	....	1	884,500	
23	Wm. H. Dale.....	1787-89 Gillingham street.....	Damask manufact'rs.	June 11..	Union..	....	....	....	....	1	....	....	....	....	1	46,100	
23	Wallace Wilson.....	W. side Waln street, south of Unity street.	Hosiery manufact'rs.	June 12..	Union ..	....	....	....	....	1	....	....	....	....	1	95,100	
23	John Sidebottom.....	4315-29 Franklin street.....	Hosiery manufact'rs.	June 25..	Union ..	....	....	....	....	....	1	....	....	....	1	412,600	
23	S. S. White Dental Manufacturing Co..	4541 Tackawanna street.....	Dental works.....	Sept. 23..	Worth'n	....	....	....	....	....	1	....	....	....	1	.....	No water used.
23	Frankford Co'ry Cl'b	Oxford road north of Leiper street.....	Athletics.....	Dec. 4..	Crown ..	....	....	....	1	....	....	....	....	....	1	161	
23	Wm. O'Brien	S. W. cor. Worth and Granite street.....	Grain dryer.....	Dec. 5..	Crown..	....	....	....	1	....	....	....	....	....	1	70	
24	Penna. R. R. Co. .. .	W. S. Thirtieth street, N. of Market.....	Repair shops.....	May 16 .	Gem....	....	....	....	....	....	....	....	....	1	1	497,700	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when set.	Name of Meter.	Size.								Total.	Cubic Feet Consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.		
24	Penna. R. R. Co.....	P. R. R., 50 feet E. of Thirty-ninth street.	Stand pipe.....	May 17..	Gem....	....	....	....	....	....	....	....	1	....	1	2,043,290	
24	Union Traction Co...	S. W. cor. Forty-third and Lancaster ave.	Car depot.....	May 24..	Crown..	....	....	1	....	....	....	....	....	....	1	15,100	
24	Penna. R. R. Co.....	E. S. Thirty-eighth st., S. of Poplar.....	Stand pipe.....	Nov. 9..	Gem....	....	....	....	....	....	....	....	1	....	1	2,518,000	
24	Lawson C. Funk.....	831 North Forty-first street.....	Residence.....	Dec. 3..	Crown..	....	....	....	1	....	....	....	....	....	1	1,100	
24	Alexander McGaw...	836 Preston street.....	Residence.....	Dec. 18..	Crown..	....	....	....	1	....	....	....	....	....	1	500	
25	Quaker City Wall Paper Co.....	W. S. Thompson, N. of Westmoreland....	Paper manufacturers	April 25..	Crown..	....	....	1	....	....	....	....	....	....	1	24,300	
25	Thos. Jaggers.....	S. E. cor. Emerald and Allegheny ave....	Woolen manufact'ers	May 8..	Stand'd	....	....	....	....	....	1	....	....	....	1	110,700	
25	Thos. Furlow & Son.	2022 Willard street.	Brass manufacturers.	June 6..	Empire.	....	....	1	....	....	....	....	....	....	1	13,700	
25	Schlichter Jute Cordage Co.....	S. W. cor. Erie and Trenton avenue.....	Rope works.	June 11..	Union..	....	....	....	....	1	....	....	....	....	1	22,900	
25	Phila. & Trenton R. R.	W. S. P. & T. R. R., 300 feet N. of Butler.	Stand pipe.....	June 13..	Stand'd	....	....	....	....	....	....	....	....	1	1	674,700	
25	E. Beitman.....	N. W. cor. Willard and Jasper streets.....	Hosiery mill.....	June 14..	Union..	....	....	....	....	....	1	....	....	....	1	134,700	
25	Robert H. Foerderer.	N. E. cor. Wheatsheaf lane and Coral sts.	Kid manufacturers..	July 27..	Kersey.	....	....	....	....	....	....	....	....	1	1	8,057,300	
25	David Harvey & Son.	Rear S. W. c. Allegheny ave. & Janney st.	Finishers.....	Sept. 27...	Crown..	....	....	....	....	....	1	....	....	....	1	41,000	
25	John Blood & Bro....	S. W. cor. Allegheny ave. and Janney st..	Knitted goods.....	Oct. 29..	Worth..	....	....	....	....	....	1	....	....	....	1	216,300	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date when Set.	Name of Meter.	Size. ½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic feet Consumed.	Remarks.
27	J. G. Brill Co	E. S. Thirty-first, S. of Chestnut street	Blacksmith shop	May 10	Crown			1							1	48,600	
27	J. G. Brill Co	E. S. Thirty-first st, S. of Chestnut street	Blacksmith shop	May 14	Trident		1								1		No water used.
27	John Maxwell's Sons	E. S. Thirtieth street, S. of Lombard	Marble yard	July 9	Union			1							1	3,500	
27	C. H. P. Littleton	S. W. cor. Thirty-sixth and Ludlow sts	Apartment house	Sept. 9	Crown							1			1	112,000	
27	Penna Laundry Co	3012-14 Market street	Laundry	Nov. 16	Gem						1				1	62,500	
27	Powelton Elec. Lt. Co.	S. W. cor. Forty-third and Media R. R.	Power house	Nov. 20	Crown								1		1		No water used.
28	Phila. Traction Co	Ridge and Susquehanna avenues	Depot	Sept. 18	Crown				1						1		
29	J. M. H. Walters	1325 North Thirty-first street	Grain drying	Aug. 26	W'rth'n					1					1	19,600	
29	Geo G. Whitby	1433 North Twenty-ninth street	Residence	Sept. 17	Trident		1								1	2,750	
29	Philip Spaeter	1334 North Thirtieth street	Cooper shop	Sept. 27	Crown					1					1	7,200	
29	Bergner & Engel B'g Company	E. S. Thirty-second, N. of Thompson st	Brewery	Oct. 2	Gem								1		1		No water used.
29	A. H. Hulshizer, M. D.	1515-17 North Fifteenth street	Residence	Oct. 23	Crown				1						1	1,500	
30	Phila. Traction Co	Sutherland avenue and Catharine street	Repair shop	Jan. 28	Trident				1						1	471,400	
30	H. C. Fox & Son	Schuylkill avenue and Catharine street	Glass works	Oct. 1	Crown				1						1	5,700	

New Meters Set—Continued.

Ward.	Occupant	Location.	Business.	Date When Set.	Name of Meter.	Size. ½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic Feet Consumed.	Remarks.
30	Kate Henderson.....	2214 Catharine street.....	Residence.....	Nov. 1...	Crown..	....	....	1	....	....	....	....	....	....	1	400	
30	Howell estate.....	N. W. cor. Twenty-first and Wash. ave...	Paper manufacturers	Dec. 19...	Gem....	....	....	....	....	....	....	....	1	....	1	.....	No water used.
31	August J. Berton.....	2363-67 Letterly street.....	Glass manufacturer..	Jan. 31...	Crown..	..	....	....	1	....	....	....	....	....	1	400	
31	Jas. Pollock & Son...	2221 Fletcher street.....	Tapestry manfrs.....	May 4...	Union..	....	....	....	....	1	....	....	....	....	1	42,700	
31	John Mair.....	S. W. cor. Amber and Adams streets.....	Carpet manfrs.....	May 4...	Crown..	....	....	....	1	....	....	....	....	....	1	100,600	
31	Robt. Carson.....	N. W. cor. Huntingdon and Trenton ave.	Carpet manfrs.....	May 25...	Pittsb'g.	....	....	....	....	1	....	....	....	....	1	365,700	
31	Scott & Williams.....	2379 East Cumberland street.....	Machinist.....	June 4...	Gem....	....	....	....	....	....	1	....	....	....	1	230,800	
31	Thos. Huston & Co...	N. W. cor. Trenton ave. and Dauphin st.	Carpets.....	Dec. 28...	Crown..	....	....	....	1	....	....	....	....	....	1	95	
33	Annie C. Adair.....	3408 North Front street.....	Residence.....	Jan. 29...	Crown..	....	....	1	....	....	....	....	....	....	1	6,200	
33	Thos. Potter Sons & Co	N. E cor. Second and Venango street....	Oil cloth.....	Feb. 27...	Crown..	....	....	....	....	1	....	....	....	....	1	.....	No water used
33	John Hamilton.....	N. E cor. Howard and Lehigh avenue...	Carpets.....	Mar. 28..	Crown..	....	....	....	....	1	....	....	....	....	1	352,700	
33	Owen Osborn.....	2800-12 N. Fourth street.....	Hosiery manufac'r..	April 8..	Crown..	....	....	....	....	....	1	....	....	....	1	287,000	
33	Robert Studholme...	448-50 E. Cambria street.....	Club house.....	April 25..	Crown..	....	....	1	....	....	....	....	....	....	1	11,000	
33	Moss Rose Mfg. Co...	N. W. cor. Allegheny ave. and Hancock..	Woolen mills.....	April 29..	Crown..	....	....	....	....	....	1	....	....	....	1	128,200	
33	George A. Fletcher..	N. W. cor. Second and Venango streets..	Cotton mill.....	May 13..	Stan'd..	....	....	....	....	....	....	1	....	....	1	587,000	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date When Set.	Name of Meter.	Size.									Total.	Cubic Feet Consumed.	Remarks.
						½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.			
33	F. A. Bachman & Co.	W. S. Second street, north of Somerset	Cotton goods	May 29..	Gem	....	....	....	....	....	1	....	....	....	1	529,600	
33	W. T. Smith & Son	W. S. Third street, north of Lehigh	Tapestry	July 13..	Gem	....	....	....	....	....	....	1	....	....	1	54,000	
33	W. T. Smith & Son	W. S. Third street, north of Lehigh	Tapestry	Aug. 3..	W'rth'n	....	....	....	....	1	....	....	....	....	1	72,800	
33	Amos Hall	2915-33 N. Second street	Cooper shop	Oct. 22..	Crown	....	....	....	1	....	....	....	....	....	1	5,000	
34	Chambers Bros. Co.	S. W. cor. Fifty-second and Media streets.	Machinist	Sept. 3..	Wr'th'n	....	....	....	....	1	....	....	....	....	1	62,900	
34	J. T. Hickman	Bryn Mawr and City avenues	Residence	Sept. 20..	Union	....	....	1	....	....	....	....	....	....	1	5,800	
34	William K. Pyrah	1430 N. Fifty-second street	Provision store	Dec. 5..	Crown	....	....	1	....	....	....	....	....	....	1	2,700	
36	Kaolin Chemical Co.	N. S. Gray's Ferry rd., W. of Thirty-first.	Chemicals	May 28..	Gem	....	....	....	....	....	....	1	....	....	1	1,941,400	
37	P. & R. W. Co.	Thirteenth street, above Huntingdon	Station	July 29..	Union	....	....	....	....	1	....	....	....	....	1	11,200	
37	Alma M. Barnes	2242 N. Seventh street	Residence	Nov. 6..	Crown	....	....	1	....	....	....	....	....	....	1	1,000	
37	M. A. Gleason	2723 N. Twelfth street	Residence	Nov. 22..	Crown	....	....	1	....	....	....	....	....	....	1	200	
37	George E. Drake	3133 N. Broad street	Residence	Dec. 18..	Crown	....	....	1	....	....	....	....	....	....	1	300	
38	Stephen McGowan	4211 Ridge avenue	Milk depot	May 8..	Crown	....	....	1	....	....	....	....	....	....	1	11,300	
38	Werner Itschner	3301 N. Nineteenth street	Finishers	May 28..	Pittsb'g	....	....	....	....	1	....	....	....	....	1	6,400	
83	John Dobson	Scott's lane and Richb. Br. P. & R Ry	Blanket mill	Aug. 1..	Gem	....	....	....	....	....	1	....	....	....	1	298,400	

New Meters Set—Continued.

Ward.	Occupant.	Location.	Business.	Date When Set.	Name of Meter.	Size. ½-inch.	⅝-inch.	¾-inch.	1-inch.	1½-inch.	2-inch.	3-inch.	4-inch.	6-inch.	Total.	Cubic Feet Consumed.	Remarks.
38	Connecting R. W. Co.	N.W. S. Glenwood avenue, W. of Broad st..	Station.....	Aug. 21...	Crown	....	....	....	....	....	....	....	1	....	1	142,200	
38	E. Stanley Perkins...	S. E. cor. Wayne and Bristol streets.....	Tannery.....	Oct. 23...	Gem	....	....	....	....	....	....	1	....	....	1	110,700	
38	Steel & Wike.....	N. E. Twentieth and Clearfield streets....	Foundry.....	Oct. 24...	Worth	....	....	....	....	....	1	....	....	....	1	3,100	
38	Moore & White Co....	N. E. cor. Fifteenth st. and Lehigh ave....	Paper Machinery.....	Nov. 18...	Trident	....	....	....	....	....	....	1	....	....	1	254,100	
39	E. E. Brown & Co....	S. E. McKean and Meadow streets.....	Machinist.....	June 12...	Union	....	....	....	....	1	....	....	....	....	1	28,300	
	Total.....					1	1	56	31	44	32	20	14	6	205	39,067,436	

METERS TESTED.

	Gem.	Trident.	Standard.	Union.	Empire.	Worthington.	Torrent.	Hersey.	Total.
4	.....	.....	.....	.....	.....	.....	.....	.....	4
...	.....	3	.....	.....	.....	.....	.....	.....	3
38	.....	5	.....	20	1	.....	.....	.....	94
14	.....	4	.....	.....	.....	.....	.....	.....	68
13	.....	5	.....	29	.....	4	.....	.....	61
38	22	1	2	2	.....	3	.....	.....	68
10	30	3	1	.....	.....	.....	.....	.....	54
8	34	.....	5	.....	.....	.....	.....	.....	47
....	4	.....	4	.....	.....	.....	3	1	12
25	90	21	12	51	1	7	3	1	411

DISTRIBUTION EXPENSES DURING THE YEAR 1901.

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

Material and Labor.	First District.	Second District.	Third District.	Fourth District.	Fifth District.	Sixth District.	Seventh District.	Distribution.	Meter Shop.	Main Office.	Total.
Lead	$1,358 67	$1,352 66	$1,807 00	$1,362 27	$1,359 81	$1,347 58	$1,349 69				$9,928 68
Gasket	40 07	10 53	108 72	60 39	43 86	37 79	42 01				343 37
Coke	26 60	44 55	308 55	77 40	72 70	79 50	52 65				661 95
Wood						81 00					81 00
Straight pipes								$93,326 04			93,326 04
Small specials								12,299 88			12,299 88
Large specials, 20-inch								145 78			145 78
Large specials, 30- to 48-inch								1,809 30			1,809 30
Breeches pipe, 20-inch								196 60			196 60
Breeches pipe, 30- to 48-inch								1,672 96			1,672 96
Frames and covers	57 06	949 21		241 70	114 99	144 80					1,549 76
Cast iron stop boxes	355 91	804 65	568 41	1,422 14	93 60	309 49	697 99				4,252 19
Hauling, transportation, and hotel	170 00	180 00	153 50	25 00	335 00	120 00	60 00	$9,762 66			10,806 16
Supplies, tools, small stores, etc	771 84	11,741 34	2,394 41	1,645 13	3,043 14	1,664 91	1,148 58	2,305 62	$7,758 76	$61 00	32,537 73
Plumbing and plumb'g suppl's		47 51	2 25		100 83	25 57					176 16
Meters, etc.									13,131 31		13,131 31
Brick, stone, lime, and cement	167 35	209 75	1,228 46	1,232 10	139 75	533 55	215 50		13 00		3,739 46

Distribution Expenses—Continued.

Material and Labor.	First District.	Second District.	Third District.	Fourth District.	Fifth District.	Sixth District.	Seventh District.	Distribution.	Meter Shop.	Main Office.	Totals.
Lumber	$3,804 81	$934 24	$1,040 04	$554 91	$1,224 51	$828 43	$258 51	.....	.....	.....	$8,645 45
Hay, feed, etc	716 69	674 66	968 17	731 54	350 58	220 10	272 43	.....	.....	.....	3,934 17
Stable supplies	103 20	15 89	28 76	43 74	512 50	17 43	715 14	.....	.....	.....	1,436 66
Stable repairs	236 07	380 88	208 88	403 44	74 55	54 06	15 25	.....	.....	.....	1,373 12
Stable medicines	25 00	21 95	37 50	10 00	.....	.....	8 75	.....	.....	.....	103 20
Stable shoeing	173 25	142 00	189 00	146 00	20 25	45 50	66 50	.....	.....	.....	782 50
Supplies, stationery	223 59	321 69	177 82	194 97	194 91	185 96	.....	$510 30	$2 45	$495 18	2,306 87
Wages..... Per diem	18,250 90	25,660 51	119,078 28	39,722 13	34,731 75	33,325 48	34,265 33	.....	.....	.....	305,034 40
Wages..... Salary	4,618 20	3,977 96	7,164 87	6,720 28	2,444 00	3,578 77	2,806 69	.....	.....	.....	31,310 77
Total cost of labor and material on account of distribution	$31,099 23	$47,469 98	$135,464 62	$54,599 14	$44,877 73	$42,599 91	$41,975 02	$122,029 14	$20,905 52	$556 18	$541,576 47
Buildings, grounds and reservoirs	.....	2,266 87	19,389 54	11,513 71	16,912 96	69 43	1,568 09	.....	.....	.....	51,711 60
Total labor and material	$31,099 23	$49,736 85	$154,845 16	$66,112 85	$61,790 69	$42,669 34	$43,543 11	$122,029 14	$20,905 52	$556 18	$593,288 07

Schedule of Pipe and Special Castings Rejected and Accepted During the Year 1901.

	Manufacturer.	Size in Inches.		Ordered.	Inspected.	Rejected.	Accepted.	
		Pipe.	Special Castings.				Quantity.	Cost.
Bureau of Water.	Donaldson Iron Co.	6		5,000	5,665	665	5,000	$19,740 30
		8		2,000	2,451	451	2,000	10,429 64
		10		2,000	2,208	208	2,000	14,200 43
		12		1,130	1,313	183	1,130	10,777 96
		16		200	275	75	200	2,825 45
	U. S. C. I. Pipe and Foundry Co.	48		375	401	26	375	35,352 26
	R. D. Wood & Co.		breeches, 48x48	2	2		2	1,542 26
	Donaldson Iron Co.		3 in. to 20 in.	3,643	3,916	273	3,643	14,286 28
	U. S. C. I. Pipe and Foundry Co.		30 in. to 48 in.	37	37		37	1,508 80
	J. Alfred Clark		stop boxes	525	537	12	525	4,252 19
			frames and covers	377	402	25	377	1,540 76
	Donaldson Iron Co.		machine work					210 40
	U. S. C. I. Pipe and Foundry Co.		machine work					300 50
	Total			15,289	17,207	1,918	15,289	$116,967 23

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

	Manufacturer.	Size in Inches.		Ordered.	Inspected.	Rejected.	Accepted.	
		Pipe.	Special Castings.				Quantity.	Cost.
Fire Mains.	R. D Wood & Co	8		727	811	84	727	$98,065 29
		12		1,049	1,137	88	1,049	
		16		437	519	82	437	
			8 in. to 16 in	152	218	66	152	
	A. P. Smith, Newark, N. J		6-inch steel fire hyd't	33	37	4	33	3,630 00
	Williamsport Valve and Hydrant Co		8-inch steel valves	70	72	2	70	2,975 00
			12-inch steel valves	34	38	4	34	2,456 50
			16-inch steel valves	20	21	1	20	2,900 00
	Middletown Car Works, Pa		stop boxes	124	124		124	1,736 00
	Total			2,646	2,977	331	2,646	$111,762 79
*Filtration.	U. S. C. I. Pipe and Foundry Co., Burlington, Scottdale, Adyston, Anniston and Buffalo	6		324	349	25	324	*
		8		34	48	14	34	
		10		98	113	15	98	
		12		140	165	25	140	
		16		1,019	1,240	221	1,019	

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

	Manufacturer.	Size in Inches.		Ordered.	Inspected.	Rejected.	Accepted.	
		Pipe.	Special Castings.				Quantity.	Cost.
*Filtration.	U. S. C. I. Pipe and Foundry Co., Burlington, Scottdale, Adyston, Anniston and Buffalo....	20	.....	1,966	2,120	154	1,966	*
		24	.....	31	34	3	31	
		30	.....	5,187	5,588	401	5,187	
		48	.....	1,225	1,450	225	1,225	
		.....	6 to 48.....	1,010	1,300	290	1,010	
	J. Alfred Clark.....	.....	stop boxes.....	168	295	37	168	$1,563 80
	Total.....	.....	.....	11,202	12,612	1,410	11,202	$1,563 80
Bureau of Correction.	U. S. C. I. Pipe and Foundry Co.....	3	.....	501	587	86	501	$990 00
		4	.....	84	96	12	84	235 00
		6	.....	84	92	8	84	395 00
		.....	3.....	12	12	.....	12	8 16
	Total.....	.....	.....	681	787	106	681	$1,628 16
	Grand total.....	.....	.....	29,818	33,583	3,765	29,818	

* The cost of material used in connection with filtration is included in the contract price for laying the various lines of pipe, and being the property of the contractor, this cost cannot be given in this table.

Attachments Made and Delivered to Districts during the Year 1901.

Districts.	Attachments made and delivered.	Lead Pipe—Feet.				Total.
		⅝-inch.	¾-inch.	1-inch.	2-inch.	
First	366	5,092	.....	.....	.....	5,092
Second	2	48	.....	.....	.....	48
Third	1,051	17,211	.....	6	.....	17,217
Fourth	681	10,548	.....	.....	.....	10,548
Fifth	253	3,495	.....	.....	.....	3,495
Sixth	87	600	792	10	5	1,407
Seventh	1,258	25,114	192	.....	.....	25,306
Totals	3,698	62,108	984	16	5	63,113

APPENDIX D

REPORT

OF

Operations at the Construction and Repair Shop Bureau of Water, During the Year 1901

Philadelphia, January 11, 1902.

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

SIR:—I herewith submit the annual report of operations at the Construction and Repair Shop, Twelfth and Reed streets, for the year ending December 31, 1901.

Respectfully,

JAS. H. DEAN,
Superintendent of Shop.

MERCHANDISE.		DR.
Inventory, January 1, 1901		$34,909 05
Bolts and nuts	$1,006 95	
Hardware	323 19	
Steel	689 49	
Wrought iron	1,454 16	
Iron castings	17,462 06	
Brass castings	7,430 43	
Lead coating	420 16	
Expansion metal	139 16	
Chandlery	154 92	
Gum Goods	401 84	
Coal	1,289 60	
Coke	22 80	
Lumber	1,044 31	
Paints brushes, oils, etc	123 98	
Brass fittings	344 86	
Oils and tallows	101 75	
Wrought iron pipe and fitting	5 30	
Lead	71 30	
Plug valves	380 00	
Forage, harness and stable supplies	165 63	
Miscellaneous	528 29	
Wages	31,434 52	
		64,994 70
Total Dr.		99,903 75

MERCHANDISE.		CR.
First District	$3,876 46	
Second District	4,784 31	
Third District	10,395 63	
Fourth District	11,500 32	
Fifth District	4,425 88	
Sixth District	7,379 74	
Seventh District	8,633 47	
		50,995 81
Fairmount machinery	$172 86	
Spring Garden machinery	1,981 65	
Spring Garden boilers	1,780 18	
Belmont machinery	993 67	
Belmont boilers	741 95	
Queen Lane machinery	1,773 95	
Queen Lane boilers	675 40	
Roxborough machinery	797 73	

Roxborough boilers	$688 94	
Frankford machinery	9,177 29	
Frankford boilers	417 31	
Mt. Airy machinery	27 58	
Chestnut Hill machinery	10 75	
		19,239 26
Buildings, grounds and reservoirs	$3,128 43	
Filtration	617 30	
Extension and improvement	1,556 80	
Meter department	619 43	
Main office	138 34	
Hydrographic work	12 96	
Distribution	227 72	
Fixed patterns	807 51	
Shop machinery	286 01	
Construction and repair shop	1,113 82	
Old metals	1,176 80	
		9,685 12
		$79,920 19
Total Cr.	$79,920 19	
Inventory, January 1, 1902	27,388 46	
	$107,308 65	
Total Dr.	99,903 75	
Balance		$7,404 90

INVENTORY, JANUARY 1, 1902.

75	No. 1 fire hydrants, $28.00	$2,100 00	
1	No. 2 fire hydrants, $35.00	35 00	
8	4-inch stop valves, $13.00	104 00	
16	6-inch stop valves, $14.50	232 00	
7	10-inch stop valves, $30.00	210 00	
4	12-inch stop valves, $37.00	148 00	
4	16-inch stop valves, $65.00	260 00	
6	20-inch stop valves, $100.00	600 00	
1	30-inch stop valves, $190.00	190 00	
2	6-inch plug stop valves, $45.00	90 00	
1	10-inch stop valve, flanged, $35.00	35 00	
6	6-inch globe valves, $30.00	180 00	
3	10-inch globe valves, $40.00	120 00	
			4,304 00

1	48-inch rotary valve, $910.00	$910 00	
2	30-inch check valves, $325.00	650 00	
2	20-inch check valves, $170.00	340 00	
5	2-inch fish traps, $3.25	16 25	
8	large drilling machines, $60.00	240 00	
7	Small drilling machines, $45.00	315 00	
1	air pump barrel, $15.00	15 00	
4	bell cranks, $15.00	60 00	
			2,546 25
	Finished parts of fire hydrants	$1,172 69	
	Finished parts of stop valves	1,755 00	
	Finished parts of rotary valves	147 00	
			3,074 69
1	48-inch rotary value, unfinished	$536 00	
2	48-inch wedge stop valve, unfinished	1,150 00	
6	10-inch globe valves, unfinished	260 00	
6	48-inch rotary quadrants, $10.75	64 50	
14	30-inch rotary quadrants, $7.00	98 00	
			2,108 50
70	old style stop screws	$495 25	
39	Viney stop screws, $1.75	68 25	
36	Viney stop screws, $4.50	162 00	
15	Barton stop screws, $4.00	60 00	
13	Barton stop screws and bonnet, $8.00	104 00	
			889 50
298	new style stop screws, 4-in. to 48-in.	$1,071 00	
105	socket screws, $2.00	210 00	
66	spindles, $2.25	148 50	
			1,429 50
539	iron bands, 4-inch to 48-inch	$1,778 50	
			1,778 50
28	4-inch fire hydrant valves, $0.70	$19 60	
235	6-inch fire hydrant valves, $1.70	399 50	
			419 10
32	air pump rod straps, $9.50	$304 00	
81	air pump rod brasses, $2.50	202 50	
61	sets gibs and keys, $4.50	274 50	
17	pump rods, unfinished	320 00	
198	fire hoe heads, $1.75	346 50	
			1,447 50
	Articles and tools carried in stock, issued to districts	$1,953 42	
			1,953 42

50,161 pounds wrought iron, 2¼	$1,128 62		
1,126 pounds Norway iron, 3½	39 41		
556 pounds iron forgings, 9	50 04		
13,639 pounds steel	1,002 22		
1,444 pounds expansion metal, 24½	353 78		
3,902 pounds lead, 4.49 cts	175.20		
217 pounds Babbit metal, 14	30 38		
34 pounds Bismuth, $1.95	66 30		
		2,845	95
56,466 pounds stop valve castings, 2.19 c.	$1,236 61		
29,895 pounds fire hydrant castings, 2.19c.	654 70		
5,169 pounds machinery castings	140 57		
6,345 pounds brass castings	1,063 28		
1,836 pounds Ajax castings, 23⅝	433 76		
352 pounds rolled brass, 22	77 44		
		3,606	36
Hardware	$155 05		
Bolts and nuts	473 93		
Oils and tallows	20 70		
Paints, brushes, etc	21 21		
Gum goods	110 54		
Lumber	203 76		
		985	19
Total		$27,388	46

Principal Articles Delivered to Purveyor's Districts and Works.

Districts.	No. 1 Fire Hydrant.	No. 2 Fire Hydrant.	Wedge Stop Valves.									Check Valves.		Rotary Valves.			Plugs.		Stop Box Risers.	Fish Traps.			Globe Valves.			Iron Bands.
			4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	36-inch.	20-inch.	36-inch.	30-inch,	36-inch.	48-inch.	Wood.	Brass.		1¼-inch.	2-inch.	6-inch.	6-inch.	8-inch.	10-inch.	
First	59	....	2	47	1	13	....	....	....	....	....	....	....	....	....	....	18	371	.....	....	....	....	....	....	....	3
Second	24	28	7	55	14	6	....	....	....	....	....	....	....	....	....	....	12	522	151	....	....	....	....	....	....	2
Third	116	10	3	224	16	3	22	....	....	....	....	....	....	1	....	....	172	360	149	....	....	....	....	....	....	25
Fourth	48	16	6	80	2	5	8	....	....	....	....	3	....	3	....	4	48	144	72	....	....	....	....	....	....	36
Fifth	44	....	3	65	....	2	7	....	1	....	....	....	....	....	....	1	6	6	.....	....	....	....	....	....	....	6
Sixth	153	....	1	112	....	....	11	....	....	1	....	....	....	....	....	....	12	72	6	....	....	....	....	....	....	48
Seventh	73	23	3	108	8	24	12	....	....	1	2	....	....	....	....	....	210	270	.....	....	....	....	....	....	....	44
Meter Department	.....	....	....	.....	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	.....	46	61	9				
Works	.....	....	....	.....	....	....	2	....	....	....	1	....	1	....	....	....	.....	.....	.....	....	....	....	2	4	4	
Filtration	.....	10																								
Extension and Improvement	24	....	....	.....	....	....	....	3	1	1																
Totals	541	87	25	691	41	53	62	3	2	3	3	3	1	4	....	5	478	1,745	378	46	61	9	2	4	4	163

PRINCIPAL ARTICLES MANUFACTURED DURING 1901.

557	No. 1 fire hydrants, $28.00.....	$15,596 00	
48	No 2 fire hydrants, $35.00.....	1,680 00	
33	4-inch wedge stop vaves, $13.00.....	429 00	
705	6-inch wedge stop valves, $14.50.....	10,222 50	
40	8-inch wedge stop valves, $22.00.....	880 00	
55	10-inch wedge stop valves, $30.00....	1,650 00	
59	12-inch wedge stop valves, $37.00....	2,183 00	
5	16-inch wedge stop valves, $65.00....	325 00	
6	20-inch wedge stop valves, $100.00...	600 00	
4	30-inch wedge stop valves, $190.00..	760 00	
1	36-inch wedge stop valves, $300.00...	300 00	
2	30-inch foot valves (for Frankford).	674 00	
3	20-inch check valves, $170.00.....	510 00	
2	30-inch check valves, $325.00.....	650 00	
1	36-inch check valve, $375.....	375 00	
3	30-inch rotary valves, $455.00.....	1,365 00	
6	48-inch rotary valves, $910.00.....	5,460 00	
1	12-inch steel check valve (fire main)	241 55	
370	stop box risers, 35.....	129 50	
899	wooden plugs, 50.....	449 50	
2,013	brass plugs.....	704 55	
107	fish traps..	454 50	
			45,639 10

APPENDIX E

REPORT

OF THE

Chief Draughtsman for the Year 1901

Philadelphia, January 8, 1902.

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 1901, is respectfully submitted.

Besides many statistical diagrams, which were made but not recorded, there were made and recorded one hundred and fifty-nine (159) drawings, as follows:

Plans and details of buildings	**27**
Details of engines	**16**
Special machinery	**10**
High Pressure Fire Service	**8**
Stop valves and details	**15**
Check valves and details	**2**
Special castings	**18**
Details of intakes and conduits	**2**
Surveys, profiles, etc.	**7**
Diagrams, tables and reports	**53**
Pumpage diagram	**1**
Total	**159**

All of these drawings required much time and labor for their perfection, and a simple statement of the number made conveys no idea of the amount of work and engineering skill involved in the designs completed.

During the year there were made about 1,800 blue prints, of various subjects, for the use of the Machine Shop and of the Pumping Stations.

Plans and specifications have been prepared for a new coal shed at the Roxborough Pumping Station, to occupy the site of the old ice house; also plans for an office, a stable, sheds, etc., for the Seventh District Yard.

The photographer was employed during the year in making photographs of buildings, machinery and contract work; also of records of drawings for the Improvement, Extension and Filtration of the Water Supply.

From data prepared by inspectors of the Bureau, 290 calculations for boiler horse power were made. From these calculations are determined the water rents to be paid by owners of steam boilers using City water.

The daily pumpage chart for the year 1901, and the daily stream flow charts for the years 1900 and 1901, have been prepared.

After the bids for furnishing the pipe and fittings for the new High Pressure Fire Service were scheduled, computations were made on the cost of steel and cast iron pipe, on the basis of the prices bid, with the result that it was decided to use cast iron pipes and cast steel fittings, as a greater quantity of pipe and fittings could thus be purchased and laid with the amount of money appropriated for the purpose.

The cast iron flanged pipe used is extra heavy, being designed to withstand a pressure of 800 pounds per square inch, with a margin of safety of seven (7), and is tested, at the foundry, to 800 pounds. When laid in the street and connected, it is again tested to 400 pounds per square inch, and all fittings are submitted to the same test.

At your request I visited the foundry of the Seaboard Steel Casting Co., at Chester, Pa., and witnessed the testing of several crosses and tees, and also tested the steel coupons representing these castings. The coupons gave a tensile strength of over 60,000 pounds per square inch, with an elongation of 20 per cent. in 8 inches.

Considerable trouble was at first experienced on account of shrinkage strains, the flanges of the castings being designed for semi-steel of a tensile strength of 40,000 pounds per square inch. The trouble was overcome by the reduction of the thickness of the flanges on all of the fittings.

A table showing the comparative cost of running gas engines and steam boilers was prepared and submitted by you to the Director of the Department of Public Works. This table showed that gas engines, for the limited time which they would be run per month, for ordinary fires, would be much cheaper, and also more practical for obtaining immediate service, than large steam boilers kept continually under pressure.

By your direction I have prepared a specification for a plant composed of 7 vertical triple cylinder gas engines with vertical double-acting cylinder pumps, direct attachment, of 2,000,000 gallons capacity per 24 hours, or 1,400 gallons per minute, requiring about 300 horse power each; also for 2 engines and pumps, of the same style, with a capacity of 500,000 gallons per 24 hours, or 350 gallons per minute, making the total capacity of the station 15,000,000 gallons per day.

These engines and pumps could be erected upon a lot of ground 80 x 138 feet, and ample room would also be afforded for an office, for storage of supplies, for bath rooms for engineers and oilers, and for air chambers and pumps.

On July 9th, at your request, I represented the City

as expert on the duty trial of the 5,000,000 gallon Worthington High Duty Duplex Compound pumping engine at the Belmont High Service Pumping Station, a report of which, in detail, is attached hereto.

I also approved, after examination, the data relative to the duty trial of the pumping engine of the same make and capacity at the Roxborough High Service Pumping Station, and recommended its acceptance with the one at Belmont.

On July 15th, at your request, I represented the City as expert on the duty trial of the 3,000,000 gallon Holly Gaskill Compound High Duty pumping engine at the Frankford High Service Pumping Station, a detailed report of which is attached hereto.

Beginning on July 22d, I supervised, at your request, the endurance tests of 72 hours duration of Engines Nos. 4, 5, 6 and 7, Worthington High Duty Duplex Compound 5,000,000 gallons capacity each, finishing the same on July 29th, running two engines at the same time.

On September 12th, at your request, I represented the City as expert on the duty trials of Engine No. 4 at Roxborough Pumping Station. The duty trial of Engine No. 6 was run on September 14th; of Engine No. 5 on September 18th, and of Engine No. 7, on September 24th. Reports, in detail, are attached hereto.

On October 11th I inspected a part of the compressed steel shafts for the engines for the new pumping station at Frankford, and tested the coupons representing the same, at Bethlehem, Pa.

On November 22d, at your request, I represented the City as expert on the duty trials of the Holly Compound Horizontal Pumping Engine No. 7, at the Belmont Pumping Station. The trial was continued for 24 hours and a detailed report of the results is attached hereto.

On November 25th and 26th the duty trials of the

remaining two Holly Horizontal Compound Pumping Engines, Nos. 5 and 6, at the Belmont Pumping Station, were run for two periods of six hours each, the result of the 24-hour duty trial being considered such as to admit of a short one, the three engines being alike, and as you gave your consent to a test of this length.

All engines built and finished for this Bureau during the past year have conformed with the requirements of the specifications therefor that the area of the low pressure pistons should be not less than six times the area of the high pressure pistons.

The duty obtained, the great saving in cost, and the simplicity of valve arrangement, which requires much less care and attention in the compound than in the triple expansion type of engine, demonstrates the advantage of your decision to adopt the former type.

REPORT

ON THE

HYDROGRAPHIC WORK

For the Years 1900 and 1901

The following report on hydrographic work and data collected during the years 1900 and 1901 is respectfully submitted.

Rainfall observations at twenty stations, three of which are provided with automatic gauges, have been continued, completing nineteen years of continuous records of data relative to precipitation.

Stream flow observations by automatic gauges on the Perkiomen, Neshaminy and Tohickon streams were continued during the year 1900 by voluntary work, but during the year 1901 the regular observers were paid from the annual appropriation allowed by City Councils for the purpose.

Owing to a leak having been found in the new dam, above the automatic gauge, it was necessary to drain off the lower dam again, which prevented the automatic stream flow observations from being taken on the Wissahickon Creek.

Observations on the Schuylkill river, with the automatic gauge put in operation at Fairmount in 1897, have been continued. These computations are probably very nearly correct in regard to the monthly and yearly flow of the river.

A comparison of the rainfall on the water shed of the Schuylkill river and of the amount of water found flowing in the river, for the years 1898, 1899, 1900 and 1901, is as follows:

Date.	Rainfall in inches.	Flowing in river, inches.	Percentage of total rainfall in river.
January 1 to December 31, 1898.....	49.53	24.39	48
January 1 to December 31, 1899.....	44.43	22.29	50
January 1 to December 31, 1900.....	39.92	18.23	46
January 1 to December 31, 1901.....	49.63	17.80	36

At present no means are available for measuring the low flows of the river for periods of less than one month.

There is no doubt but that the average daily flow given in Table VIII is very often during the month much less than there recorded.

To determine the low flow, and its continuance, it would be necesary to know whether all the storage dams on the river from Fairmount pool to the head waters were full and running over, and whether the full volume of the river was flowing at the station where the observations were being taken.

The greatest monthly rainfall during the year 1901 was 9.42 inches at the Weather Bureau, Ninth and Chestnut streets, and 8.75 by the automatic gauge at Fairmount, and occurred in August. There was a deficiency in the months of January, February, June and November, and an excess in the months of August and December.

The automatic gauge at Philadelphia recorded 22 rainfalls, that at Spring Mount, on the Perkiomen, 24, and the one at Forks of Neshaminy, 26, in which the rate exceeded more than .25 of an inch per hour.

A very heavy rainfall occurred in the Neshaminy watershed on the night of March 10th, amounting to 2.40 inches, the greater part of which fell inside of four hours, and, at times, at the rate of 3 inches per hour.

As the ground was frozen, all of the water found its

way into the creek, and caused a rise of nearly 12 feet at the gauge, in about six hours. In twenty-four hours the water had receded to less than 3 feet on the gauge.

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

I. Monthly precipitation on sundry water sheds.

II., III., IV. Rain storms exceeding ¼ inch per hour.
- Philadelphia.
- Forks of Neshaminy.
- Frederick.
- Perkiomen Valley.

V. Inches of rainfall flowing in the.....
- Perkiomen.
- Neshaminy.
- Tohickon.

VI. Average annual yield of streams.

VII. Comparative stream flow.....
- Perkiomen.
- Neshaminy.
- Tohickon.
- Wissahickon.
- Schuylkill.

VIII., IX. Monthly and daily yield of.....
- Perkiomen.
- Neshaminy.
- Tohickon.
- Wissahickon.
- Schuylkill.

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

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

Mr. Thomas J. Beans, Moorestown, N. J.

During the years 1900 and 1901 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.

RESULTS OF THE TEST

OF

ONE HOLLY HIGH DUTY PUMPING ENGINE, No. 513

AT THE

Frankford High Service Pumping Station, Philadelphia

July 18, 1901

Test to determine the capacity and duty of pumping engine No. 513, furnished by The Holly Manufacturing Co., of Lockport, N. Y., for the Frankford High Service Pumping Station, Philadelphia, was run from 10.30 A. M., July 18th, to 9.30 P. M., July 18th, 1901.

The engine is of the Horizontal Rotative High Duty, Compound Condensing type, with two high pressure steam cylinders, 12 inches diameter, two low pressure steam cylinders 32 inches, two double acting water plungers 13⅞ inches diameter, all of 24-inch stroke.

The specification required the pump to be designed, in capacity and pressure, to meet future demands upon it. These conditions could not at this time be fully complied with, as the water mains are not all laid and the maximum quantity of water cannot be used in the district intended to be supplied.

It was therefore determined to run under conditions of water and steam pressure corresponding as nearly as practicable with the requirements of the specification, the water pressure being obtained by partially closing a 16-inch gate valve in the delivery main just outside the pumping station; further, that the duty in foot pounds should be computed on the basis of 1,000 pounds dry steam used by the engine, the quantity of steam so used to be determined by weighing

the water drawn from the surface condenser, including the high and low pressure jackets.

The surface condenser is in the suction main and the large volume of condenser water necessarily brings the temperature of the condensed water much lower than the rejected water and vapor.

For this reason the temperature of the water in the weighing barrels was not taken for any purpose of computation.

Mr. John E. Codman, Chief Draughtsman, Bureau of Water, represented the City. He was assisted by Messrs. J. H. Hand, Martin Murphy, C. B. F. Waller and Edward Hamm; Mr. D. A. Decrow represented the contractors.

Observations were taken every thirty (30) minutes during the time of the test, and the conditions throughout the test remained practically constant. The pressures to determine head pumped against were observed from gauges attached to suction and delivery of engine; the gauges were standardized before the test and found to be correct. The steam used by the engine, after passing through the condenser, was weighed in a barrel placed on platform scales, into which barrel was also let the water of condensation from steam cylinder jackets.

The surface condenser in suction was tested before the duty test, and found to be tight, therefore the water delivered in barrels represents only the steam used in cylinders and jackets.

No Calorimeter observations were taken, but observations taken from boilers of the same type and size, and working under almost exactly the same conditions, showed 1.38 per cent. moisture, and the boiler used in testing this engine was assumed to give equally good results.

The engine operated very satisfactorily during the test, although running about 27 per cent. above its guaranteed capacity of 3,000,000 gallons per 24 hours.

DATA.

Duration of test	11	hours.
Size of engine, 12 x 32 x 13⅞ x 24 inches.		
Total number of revolutions	28,626	
Average revolutions per minute	43.37	
Length of stroke	24	inches.
Average steam pressure	133.1	lbs.
Average water pressure, delivery	120.6	lbs.
Average water pressure, suction	8.1	lbs.
Distance between gauges 4.41	1.89	lbs.
Total head pumped against	114.4	lbs.
Total weight of steam used by engine	32,984	lbs.
Moisture in the steam	1.38	per cent.
Total weight of dry steam used by the engine	32,529	lbs.
Net area of one plunger	147	sq. inches.

Duty per 1,000 pounds steam,

$$\frac{4 \times 28626 \times 147 \times 114.4 \times 2}{32{,}984} = 116{,}800{,}000$$

Duty per 1,000 lbs. dry steam, 118,400,000

Pump Horse Power,

$$\frac{4 \times 28626 \times 147 \times 114.4 \times 2}{60 \times 11 \times 33{,}000} = 176.8$$

Pounds of steam per Horse Power per hour .. 16.9

Pounds of dry steam per H. P. per hour..... 16.67

Capacity per 24 hours plunger displacement,

U. S. gallons,

$$\frac{4 \times 28626 \times 147 \times 24 \times 2.182}{231} = 3{,}815{,}856$$

Less 2½% for slip, as per specification= 3,720,460

Signed,

D. A. DECROW,
Representing Holly Mfg. Co.

JOHN E. CODMAN,
Representing Bureau of Water.

RESULTS OF THE TESTS

OF

TWO WORTHINGTON HIGH DUTY PUMPING ENGINES Nos. 1602 and 1603

AT THE

ROXBOROUGH AND BELMONT HIGH SERVICE STATIONS, PHILADELPHIA

June 28-29 and July 9, 1901

Test to determine the capacity and duty of pumping engine No. 1,502, furnished by H. R. Worthington, for the Roxborough High Service Pumping Station, Philadelphia, was run from 10 A. M., June 28th to 10 A. M., June 29th, 1901.

Test of the Belmont H. S. engine No. 1,503, on July 9th, 1901, from 9.30 A. M. to 9.30 P. M.

These engines are of the Duplex, High Ratio, High Duty, Compound Condensing type, with two high pressure steam cylinders, 13 inches diameter, two low pressure steam cylinders 36 inches, two double acting water plungers 17 inches diameter, all of 36-inch stroke.

The specifications required the pumps to be designed, in capacity and pressure, to meet future demands upon them. These conditions could not at this time be fully complied with, as the water mains are not all laid and the maximum quantity of water cannot be used in the district intended to be supplied.

It was therefore determined to run under the present daily conditions of water and steam pressure, and further, that the duty in foot pounds should be computed on the basis of 1,000 pounds of dry steam used by the engines, the quantity of steam so used to be determined by weighing the water drawn from the surface condenser, including the receiver and the high and low pressure jackets.

The surface condenser is in the suction main and the large volume of condensing water necessarily brings the temperature of the condensed water much lower than the rejected water and vapor.

For this reason the temperature of the water in the weighing barrels was not taken for any purpose of computation.

Mr. John E. Codman, Chief Draughtsman, Bureau of Water, represented the City. He was assisted by Messrs. J. H. Hand, Martin Murphy, C. B. F. Waller and Edward Hamm. Mr. A. P. Bollar, Jr., and John Primrose and others represented the contractors.

Observations were taken every thirty (30) minutes during the time of the tests, and the conditions throughout the tests remained constant. The pressures to determine heads pumped against were observed from gauges attached to suction and delivery of engines; the gauges were standardized before and after the tests, and found to be correct. The steam used by the engine, after passing through the condenser, was weighed in two barrels placed on platform scales, into which barrels was also let the water of condensation from steam cylinder jackets and receivers.

The surface condensers in suction and main exhaust feed water heater were both tested before and after the duty test and found to be tight, therefore the water delivered in barrels represents only the steam used in cylinders and jackets.

All steam used by air compresssors during the tests was condensed in separate barrels, weighed at end of tests and charged against engines. Observations to determine the amount of moisture in steam were taken at intervals during test, on Barrus Calorimeter atttached just above main throttle.

The engines operated very satisfactorily during the test, although running about 20 per cent. above their guaranteed capacity of 5,000,000 gallons per 24 hours.

Observations on Venturi meter attached to delivery main at Roxborough Station showed 5,797,000 gallons pumped during 24 hours, which would be 4.8 per cent. less than water pumped by displacements. This meter was not calibrated for this service and its condition was not therefore known. Allowing the usual error of such a meter the slip would not exceed 2 per cent.

	Roxborough.	Belmont.
Duration of test	24 hrs.	12 hrs.
Total number of revolutions	41,351	20,427
Average number of revolutions per minute	28.68	28.37
Average length of stroke	37.96 in.	38.0 in.
Average steam pressure	95 lbs.	111.25 lbs.
Average water pressure delivery)	59.78 lbs.	79 lbs.
Average water pressure (suction)	1.79 lbs.	9 lbs.
Distance between gauges	2.81 lbs.	2.9 lbs.
Total head pumped against	60.8 lbs.	72.9 lbs.
Total weight of steam used by engine	59,510 lbs.	34,402 lbs.
Moisture in steam, by calorimeter	1.37 %	1.39 %
Total weight of dry steam used by engine	58,695 lbs.	33,924 lbs.
Net area, one plunger (square inches)	224	224
Duty on 1,000 pounds dry steam,		
No. 1502. $\frac{4 \times 41351 \times 224. \times 60.8 \times 3.16}{58,695} =$	121,280,000	
No. 1503. $\frac{4 \times 20427 \times 224 \times 72.9 \times 3.16}{33,924} =$		124,285,000
Pump horse power,		
No. 1502. $\frac{4 \times 41351 \times 224. \times 60.8 \times 3.16}{60 \times 12 \times 33,000} =$	149.96	
No. 1503. $\frac{4 \times 20427 \times 224 \times 72.9 \times 3.16}{60 \times 12 \times 33,000} =$		177.4
Pounds of steam per horse power, per hour	16.30	15.9
Capacity by displacement in 24 hours,		
No. 1502. $\frac{4 \times 41351 \times 224. \times 37.96}{231} =$	6,088,742 gals.	
Less 2½ % for slip, as per specifications, =	5,936,000 gals.	
No. 1503. $\frac{4 \times 20467 \times 224 \times 38}{231} =$		6,021,682 gals.
Less 2½ % for slip, as per specification =		5,871,091 gals.

Signed,

A. P. BOLLER, JR.,
Representing Henry R. Worthington.
JOHN E. CODMAN,
Representing Bureau of Water.

RESULTS OF THE TESTS OF

FOUR WORTHINGTON HIGH DUTY PUMPING ENGINES

ROXBOROUGH PUMPING STATION

The trials, as required under the Specification, to determine the Duty and Capacity of the four High Duty Pumping Engines furnished by Henry R. Worthington for the Roxborough Pumping Station, were run on the dates shown in the accompanying tabulated report of the results.

The 72-hour endurance test of each engine, against a pressure of 225 pounds, as was required by the Specification, before the duty test should be run, was made between July 22d and 30th, 1901, and, as already reported on July 30th, proved satisfactory.

The Specification provides for a test of the engines on a heat unit basis, and required that each of them shall perform a duty (on this basis), of not less than 120 foot pounds per heat unit, with 150 pounds of steam at the throttle.

As the piping and arrangements at this Station necessitate that several engines are run from the same boilers, and for other reasons, it was found impracticable to determine the amount of steam used by the engines by weighing water into the boilers, and it was agreed that the steam used by the engines be measured by weighing the air pump discharge from the surface condenser, and by condensing and weighing the water drawn from the jackets and from the engine separator, which was done by draining the water into two sets of weighing tanks and scales.

As the engines are each provided with feed water heaters in the main exhaust, and with devices for returning

jacket water to the boilers, the temperature of the feed water passing through the heaters was determined and the temperature of the jacket water before condensing noted. and credit given to the engine for this heat returned to the boilers.

Observations were taken every thirty minutes on counter temperatures and gauges, and the totals obtained separately for each hours' run on the weighing tanks.

All conditions remained very constant during the tests, and the engines operated very smoothly and satisfactorily, exceeding the contract requirements by about 9 per cent. in Duty and 15 per cent. in Capacity, as is shown in the tabulated report herewith, which gives full details of the averages of observations and results of tests.

During the tests the City was represented by Mr. John E. Codman, Chief Draughtsman, assisted by Messrs. J. H. Hand, Jr., Martin Murphy, C. B. F. Waller and Edward S. Hamm.

The contractors were represented by Mr. A. P. Boller, Jr., assisted by Messrs. N. C. Butler, Jr., Wm. Kirkbride and Alex. Kohler.

Signed,

A. P. BOLLER, JR.,
Representing Henry R. Worthington.

JOHN E. CODMAN,
Representing Bureau of Water.

TABULATED RESULTS OF DUTY TRIALS.

Four Worthington High Duty Pumping Engines, Roxborough Pumping Station, Philadelphia.

Date of trial (1901)	Sept. 12	Sept. 14	Sept. 18	Sept. 24
Duration of trial (hours)	12	12	10½	12
Engine number	1461	1501	1462	1500
Number of steam cylinders	2 H. P. 2 L. P.	2 H. P. 2 L. P.	2 H. P. 2 L. P.	2 H. P. 2 L. P.
Diameter of steam cylinders (inches)	18. 50.	18. 50.	18. 50.	18. 50.
Diameter of piston rods, steam cylinders (inches)	3½ 2-2⅞	3½ 2-2⅞	3½ 2-2⅞	3½ 2-2⅞
Nominal stroke (inches)	36.	36.	36.	36.
Number of water plungers	2.	2.	2.	2.
Diameter of water plungers (inches)	17.	17.	17.	17.
Diameter of piston rods, water cylinders (inches)	4⅛	4⅛	4⅛	4⅛
Avera e length of stroke during trial (inches)	38.	38.	38.	38.
Temperatures.				
Temperature of jacket water (degrees F.)	352.6	357.3	336.4	349.7
Temperature of feed before main exhaust heater (degrees F.)	75.	75.8	76.	70.
Temperature of feed after main exhaust heater (degrees F.)	116.	125.6	118.	119.
Pressures.				
Barometric	14.6	14.6	14.7	14.8
Vacuum	27.3	28.	27.8	28.

Tabulated Results of Duty Trials—Continued.

Steam pressure indicated by gauge (pounds)	154.5	154.4	152.8	150.4
Water pressure indicated by gauge (pounds)	164.	164.	164.	164.
Vertical distance from surface of water to gauge (feet—inches)	24 ft. 3½ in.	25 ft. 1¼ in.	25 ft. 3 in.	25 ft. 6 in.
Total head (pounds)	174.5	174.8	174.9	175.0
Rejected Water.				
Weight of water from air pump discharge (pounds)	64,054	66,301	54,547	63,346
Weight of water from jacket (pounds)	11,555	12,318	10,675	11,895
Total weight of water (pounds)	75,609	78,619	65,222	75,241
Total weight of dry steam (pounds)	74,278	76,905	64,276	73,600
Miscellaneous Data.				
Total number of revolutions	20,408	20,503	17,514	20,042
Average number of revolutions per minute	28.34	28.4	27.8	27.8
Moisture in steam by calorimeter (per cent)	1.76	2.18	1.45	2.18
B. T. U^{s}. in 1 pound steam with moisture, at average pressure	1,179.16	1,175.6	1,181.6	1,174.95
B. T. U^{s}. in 1 pound water returned to boiler by jacket	324.0	329.0	307.0	321.0
B. T. U^{s}. in 1 pound water returned to boiler by heater	40.9	49.8	41.9	49.0
Total B. T. U^{s}. charged to engine allowing 100 B. T. U^{s}. as per specification	81,594,208	84,562,596	70,544,115	80,884,075
Total B. T. U^{s}. returned by jacket	3,743,820	4,052,622	3,277,255	3,818,134

Tabulated Results of Duty Trials—Continued.

Total B. T. Us. returned by heater	2,619,808	3,301,789	2,285,519	3,103,978
Total net B. T. Us. charged to engine	75,230,580	77,208,185	64,981,371	73,691,963
Duty per heat unit as per contract (feet—pounds	131.81	129.26	131 26	132.05
Duty per 1000 pounds dry steam (feet—pounds)	133,504,000	129,767,000	132,705,000	132,700,000
Pump horse power (H. P.)	417.3	420.0	410.2	411.0
Pounds of steam per pump horse power, per hour	14.82	15.25	14.92	14.92
Capacity rate per 24 hours, by plunger displacement (gallons.)	5,916,660	5,944,200	5,803,010	5,810,550
Capacity less 2½ per cent. as per specification (gallons)	5,768,740	5,995,600	5,657,935	5,665,286

DUTY AND CAPACITY TRIALS

THREE HOLLY HORIZONTAL COMPOUND CONDENSING PUMPING ENGINES

BELMONT PUMPING STATION

PHILADELPHIA, PA.

The accompanying tabulated report shows the results obtained from the duty and capacity trials of the three engines furnished by the Holly Manufacturing Co. for the Belmont Pumping Station, as required under the specification.

Paragraphs 37 and 38 of the specification require an endurance trial of 72 hours continuous pumping against a head of one hundred and fifty (150) pounds pressure, and the delivery of not less than eight (8) million gallons per 24 hours, by plunger displacement.

The trials proved entirely satisfactory, and were made on the following dates:

Engine No. 519, No. 5, September 24-27, 1901.
Engine No. 520, No. 6, October 26-29, 1901.
Engine No. 521, No. 7, October 29-November 1, 1901.

The specification provides for a duty test of thirty (30) days, on a coal basis, or a duty test on a heat unit basis, and requires that each engine shall perform a duty (on this basis) of not less than one hundred and twenty (120) foot pounds per heat unit, with 150 pounds of steam pressure at the throttle.

The contractor chose to adopt the heat unit method of ascertaining the duty of the engines.

The engines are supplied with jet condensers, which require that the heat used by the engines shall be determined by weighing the water fed to the boilers. For this purpose two tanks were used, one of which was placed upon platform scales. The weight of the water was carefully obtained and it was then run off into the second tank, from which it was pumped by a feed pump attached to the engine.

This work, amounting to about three-tenths of one per cent. of the total work performed by the engine, is not included in the duty shown on the tabulated report.

The boilers used for the test were Nos. 21, 22 and 23, their location and piping being the most convenient.

The liability for leakage of steam was the greatest for Engine No. 519 (No. 5), and least for Engine No. 521 (No. 7), Engine No. 520 (No. 6), being a mean between the other two.

The results obtained on Engine No. 519 (No. 5), are, therefore, slightly less than those of the other two engines.

This is due, beyond a doubt, to the numerous branch connections leading from the main steam pipe.

Observations of the counter, steam, water, vacuum and receiver gauges were taken every thirty minutes, and the total for each hour's run on the feed water tanks.

The running conditions of the engines were carefully observed and noted during the trials, and their performance was entirely satisfactory.

The running of the engines was smooth and regular, and as shown on the accompanying tabulated statement, exceeded the contract requirements both as to capacity and duty, as follows:

Capacity.

Engine No. 519, No. 5, 12%.
Engine No. 520, No. 6, 9%.
Engine No. 521, No. 7, 7%.

Duty.

Engine No. 519, No. 5, 3%.
Engine No. 520, No. 6, 5%.
Engine No. 521, No. 7, 5%.

The tests were conducted by the Engineering Corps of the Bureau, represented by Mr. John E. Codman, Chief Draughtsman, assisted by Messrs. J. H. Hand, Martin Murphy and C. B. F. Waller.

The Holly Manufacturing Company was represented by Mr. Chas. H. Anderson, assisted by Messrs. Sam, Reamer and John S. Reamer.

Signed,
CHAS. H. ANDERSON,
Representing Holly Mfg. Co.
JOHN E. CODMAN,
Representing Bureau of Water.

TABULATED RESULTS OF DUTY TRIALS.

Three Holly Horizontal Compound Pumping Engines, Belmont Pumping Station, Philadelphia.

Date of trial (1901)	Nov. 22, 23.	Nov. 25.	Nov. 26.
Duration of trial (hours)	24	6	6
Engine number (station)	7	6	5
Number of steam cylinders (number)	4	4	4
Diameter of steam cylinders (inches)	H. 20 L. 50	H. 20 L. 50	H. 20 L. 50
Ratio of high pressure cylinder to low pressure cylinder	H. 1 L. 6.25	H. 1 L. 6.25	H. 1 L. 6.25
Diameter of piston rods—steam (inches)	H. 3¾ L. 5¼	H. 3¾ L. 5¼	H. 3¾ L. 5¼
Normal stroke (inches)	38	38	38
Number of water plungers (number)	2	2	2
Diameter of water plungers (inches)	22½	22½	22½
Diameter of plunger rods (inches)	5½	5½	5½
Diameter of suction pipe (inches)	30	30	30
Diameter of discharge pipe (inches)	30	30	30
Diameter of fly-wheels (feet)	16	16	16
Weight of fly-wheels (pounds)	36,000	36,000	36,000
Revolutions per minute for capacity, 2½ per cent. for slip (revolutions)	28.42	28.42	28.42
Speed per minute (feet)	180	180	180
Diameter of main journal (inches)	11.5	11.5	11.5

TABULATED RESULTS OF DUTY TRIALS—Continued.

Three Holly Horizontal Compound Pumping Engines, Belmont Pumping Station, Philadelphia.

Length of main journal (inches)	19.5	19.5	19.5
Diameter of crank pin (inches)	6.75	6.75	6.75
Length of crank pin (inches)	8	8	8
PRESSURES.			
Barometric (pounds)	14.84	14.53	14.66
Vacuum (inches)	29	28.5	28.9
Steam pressure indicated by gauge (pounds)	147.1	148.84	148.3
Steam pressure absolute by gauge (pounds)	161.94	163.37	162.96
Steam pressure receiver (pounds)	5.5	7.0	6.8
Steam pressure high pressure jacket (pounds)	147	148	148
Steam pressure low pressure jacket (pounds)	17	17	17
Water pressure indicated by gauge (pounds)	99.9	98.3	100
Vertical distance, surface of water to gauge (pounds)	11.06	11.5	10.34
Total head (pounds)	110.96	108.8	110.34
MISCELLANEOUS.			
Total weight of water, weighed to boilers (pounds)	165,981	41,529	44,250
Total number of revolutions	43,267	11,012	11,344

TABULATED RESULTS OF DUTY TRIALS—Continued.

Three Holly Horizontal Compound Pumping Engines, Belmont Pumping Station, Philadelphia.

Average number of revolutions per minute	30.04	30.58	31.51
B. T. Us. in one pound steam at average pressure	1,193.1	1,193.3	1,193.3
Total B. T. Us. charged to engine allowing 100 B. T. Us. as per specification	1,125.1	1,125.3	1,125.3
Duty per heat unit	125.73	126.41	123.95
Duty per 1000 pounds dry stream	141,467,400	142,256,300	139,500,000
Duty as per contract	120	120	120
Duty in excess of contract (per cent.)	5	5	3
Pump horse power	494.1	497.2	520
Pounds steam per pump horse power per hour	14.0	13.92	14.18
Capacity rate per twenty-four hours by plunger displacement (gallons)	10,981,164	11,179,382	11,516,428
Capacity rate per twenty-four hours, less 2½ per cent, as per specification (gallons)	10,706,635	10,899,898	11,228,518
Total number suction valves, one stroke	79	79	79
Aggregate area suction valves, one stroke (square inches)	449.5	449.5	449.5
Net area of plunger (square inches)	385.7	385.7	385.7

TABLE II.

Rain Storms Exceeding in Rate 0.25 Inches per Hour as Recorded by the Automatic Rain Gauge at Philadelphia, for the Year 1901.

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.	
March 11th, rain storm	1.43	16—15	.43	25	1.03	
April 3d, rain storm	2.24	31—45	.25	60	.25	
May 10th, rain storm	1.48	17—10	.73	35	1.25	
June 2d, shower	.58	3—55	.45	30	.90	
June 26th, shower	.73	1—30	.73	35	1.25	
July 4th, shower	.40	0—15	.40	15	1 60	
July 8th, shower	.50	3—0	.35	30	.70	
July 9th, shower	1.31	1—15	1.30	40	1 95	
July 26th, shower	.96	2—5	.61	35	1.05	
August 15th, rain storm	.73	16—50	.58	30	1.16	
August 18th, shower	1.80	3—00	.60	40	.90	
August 18th	1.50	.52	.....	.....	.....	Interval of 1 hr. 40 min. between showers.
August 18th	1.15	.40	.....	.....	.....	
August 24th, rain storm	1.20	13—30	.70	25	1.68	
September 1st, rain storm	1.28	6—30	1.03	56	1.10	
September 3d, shower	.34	1—25	.30	30	.60	
September 11th, rain storm	1.30	4—00	.20	35	.43	
September 16th, shower	.49	1—45	.45	40	.67	
September 29th, rain storm	.48	13—30	.17	25	.41	
November 24th, rain storm	2.76	23—45	.25	25	.60	
December 15th, rain storm	1.26	10—30	.30	60	.30	
December 29th, rain storm	3.28	34—10	.30	60	.30	

ions at Philadelphia.

	Tohickon Series.			Neshaminy Series.		
Otisville.	Quakertown.	Smith's Corner.	Point Pleasant.	Lansdale.	Forks of Neshaminy.	Doylestown.
90	536	480	119	350	143	405
Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
68	2.57	2.36	2.55	2.24	2.63	2.35
37	0.99	0.45	0.78	0.38	0.99	1.51
54	5.11	4.88	4.35	4.20	6.23	4.80
86	5.54	5.18	5.87	5.34	4.77	5.34
88	4.86	5.46	5.35	5.06	5.64	6.06
03	2.48	1.34	0.88	1.87	2.39	3.29
29	2.22	3.17	3.00	6.68	7.24	6.93
29	6.24	8.12	8.31	5.74	8.37	8.18
53	3.07	3.17	1.77	2.45	5.41	4.30
57	1.73	1.33	1.16	1.42	1.38	0.96
93	1.97	1.93	2.04	2.59	2.31	2.85
33	8.05	7.72	7.34	6.66	7.79	7.96
30	44.83	45.11	43.40	44.63	55.15	54.53
02	99	100	96	98	121	120
64	48.82	52.35	49.51	45.81	46.09	47.70
20	124	133	125	116	117	121
34	3.99	7.24	6.11	1.18	9.06	6.83
8.8	8.1	13.8	12.3	2.3	19.6	14.3

TABLE III.

Rain Storms Exceeding in Rate 0.25 Inches per Hour, as Recorded by the Automatic Rain Gauge at Forks of the Neshaminy, for the Year 1901.

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.	
March 11th, rain storm	2.40	14—40	1.00	20	3.00	
March 21st, rain storm	1.79	12—5	.35	25	.84	
March 26th, rain storm	.76	27—30	.41	30	.82	
April 4th, rain storm	1.43	31—10	.25	60	.25	
May 29th, rain storm	1.20	13—55	.15	15	.60	
June 2d, shower	.44	1—10	.34	15	1.36	
June 7th, shower	.58	4—10	.28	15	1.12	
June 21st, shower	.27	0—45	.20	20	.60	
June 27th, shower	.33	1—45	.30	25	.72	
July 6th, shower	1.05	4—10	.52	15	2.08	
July 7th, shower	1.20	3—50	.40	15	1.60	
July 12th, shower	1.00	6—55	.65	45	.87	
July 15th, shower	.60	1—30	.59	35	1.01	
July 29th, shower	.70	1—15	.60	20	1.80	
August 4th, shower	.29	—20	.25	15	1.00	
August 6th and 7th, rain st'm.	2.15	27—50	.50	20	1.50	
August 15th, shower	.40	2—40	.30	8	2 25	
August 18th, rain storm	2.18	26—00	.55	35	.94	
August 23d, shower	.50	5—20	.45	20	1.35	
August 24th, rain storm	1.65	4—50	1.00	50	1.20	
September 1st, rain storm	3.03	9—00	2.65	90	1.76	
September 11th, shower	.96	1—45	.90	40	.45	
September 17th, shower	.35	1—20	.20	20	.60	
November 24th, rain storm	1.72	19—25	.25	60	.25	
December 15th, rain storm	1.31	18—40	.25	60	.25	
December 29th, rain storm	2.98	37—50	.25	60	.25	

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 1901.

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.	
March 11th, rain storm.....	1.12	11—10	.47	60	.47	
April 3d, rain storm.....	1.27	15—50	.25	60	.25	
April 20th, rain storm.....	1.00	22—30	.30	30	.60	
May 25th, rain storm.....	.70	20—10	.20	20	.60	
May 29th, rain storm.....	.99	20—00	.25	60	.25	
June 2d, shower.....	.68	1—25	.47	25	1.33	
June 7th, shower.....	1.17	5—15	.82	60	.82	
June 29th, shower.....	.20	1—30	.20	20	.60	
July 12th, shower.....	2.08	12—30	.30	30	.60	
July 12th, shower.....	.....	.....	1.55	128	.72	
July 23d, shower.....	.48	2—55	.28	20	.84	
July 27th, shower.....	.74	2—45	.24	30	.48	
July 29th, shower.....	.57	1—20	.55	80	.41	
August 7th, rain storm.....	1.24	26—30	.52	40	.78	
August 15th, shower.....	.41	1—45	.36	50	.43	
August 18th, rain storm.....	1.10	16—30	.30	40	.45	
September 11th, rain storm...	.75	8—40	.35	60	.60	
September 29th, rain storm...	.60	9—00	.20	30	.40	
September 30th, shower.....	.36	1—10	.30	35	.51	
October 3d, rain storm.....	.80	13—10	.15	20	.45	
October 13th, rain storm.....	.80	15—5	.15	15	.60	
November 24th, rain storm...	1.90	18—15	.40	60	.40	
December 15th, rain storm...	1.22	16—40	.40	35	.70	
December 29th, rain storm....	3.56	36—50	.40	60	.40	

TABLE V.

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

Watersheds.	Area in Miles.	Percentage of Total Area.				Average for Seventeen Years—1883-1900.											
		Woodland.	Cultivated.	Flats.	Roads.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Perkiomen at Frederick, 17 years	152	25	71	2	2	2.95	3.73	3.69	2.10	1.44	0.83	1.33	0.97	1.00	0.83	1.68	1.97
Neshaminy below Forks, 17 years	139.3	6	92	½	2	3.36	4.20	3.57	1.97	1.74	0.76	1.03	0.91	0.78	0.62	1.51	2.14
Tohickon, 17 years	102.2	24	72	2	2	3.94	4.80	4.58	2 42	2.04	0.82	1.26	1.18	1.15	0.79	2.07	2.52
Perkiomen at Frederick. Maximum, 17 years						5.10	9.73	5.58	3.48	6.66	2 65	4.89	2.48	3.68	2.36	6.67	3.77
Perkiomen at Frederick. Minimum, 17 years						0.59	1.25	1.56	0.97	0.46	0.28	0.17	0.28	0.16	0.20	0.34	0.63
Neshaminy below Forks, Maximum, 17 years						6.77	10 44	7.41	3.57	7.41	2.46	5.47	3.37	3.51	2.55	6.31	4.56
Neshaminy below Forks, Minimum, 17 years						1.60	0.90	1.51	1.03	0.35	0.08	0.04	0.14	0.03	0.06	0.11	0,41
Tohickon, Maximum, 17 years						7.34	10.41	9.00	4.76	8.56	3.43	6.41	3.75	5.49	3.54	7.97	4.28
Tohickon, Minimum, 17 yearrs						0.54	1.19	1.83	0.73	0.25	0.08	0.08	0.10	0.04	0.05	0.14	0.67

TABLE V.

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

Watersheds.	Area in Miles.	Percentage of Total Area.				Average for 18 Years 1883-1901.												
		Woodland.	Cultivated.	Flats.	Roads.	January.	February.	March.	April.	May.	June.	July.	August.	ptem ber.	October.	November.	December.	Annual.
Perkiomen at Frederick, 18 years	152	25	71	2	2	2.86	3.51	3.67	2.17	1.46	0.87	1.28	0.97	0.98	0.82	1.61	2.10	22.61
Neshaminy below Forks, 18 years	139.3	8	92	½	2	3.24	3.98	3.67	2.05	1.76	0.77	1.06	0.99	0.83	0.61	1.46	2.38	22.32
Tohickon, 18 years	102.2	24	72	2	2	3.81	4.54	4.61	2.49	2.06	0.87	1.19	1.20	1.15	0.73	1.97	2.75	27.25
Perkiomen at Frederick — Maximum 18 years						5.49	9.73	5.58	3.48	6.66	2.65	4.89	2.48	3.68	2.36	6.67	4.22	
Perkiomen at Frederick — Minimum 18 years						0.59	0.30	1.56	0.97	0.46	0.28	0.17	0.28	0.16	0.20	0.24	0.63	
Neshaminy below Forks — Maximum, 18 years						6.77	10.44	7.41	3.57	7.41	2.46	5.47	3.37	3.51	2.55	6.31	4.63	
Neshaminy below Forks — Minimum, 18 years						1.25	0.34	1.51	1.03	0.35	0.08	0.04	0.14	0.03	0.06	0.11	0.41	
Tohickon — Maximum, 18 years						7.34	10.41	9.00	4.76	8.56	3.43	6.41	3.75	5.49	3.54	7.97	7.02	
Tohickon — Minimum, 18 years						0.54	0.09	1.83	0.73	0.25	0.08	0.05	0.10	0.04	0.05	0.14	0.67	

TABLE VI—*Average Annual Yields of Sundry Watersheds to October 1, 1900.*

Watersheds.	Period covered, years.	Area in miles.	Average rainfall in inches.	Average rainfall flowing off in inches.	Per cent. flowing off.	Average annual yield in gallons.	Average daily yield in gallons.	Average yield in cubic feet per second per square mile of drainage area.	Average yield in cubic feet per second per square mile of drainage area for each inch of rainfall.
Perkiomen at Frederick	17	152	47.345	23.147	48.88	61,140,855,637	167,352,927	1.704	0.0360
Neshaminy below Forks	17	139.3	47.642	22.544	47.32	54,572,485,200	149,427,323	1.660	0.0350
Tohickon	17	102.2	49.106	27.860	56.70	49,478,107,900	135,435,234	2.050	0.0417
Wissahickon		64.6				See table viii.			
Schuylkill	2	1,915	49.839	23.773	48.00		1,794,401,000	1.752	0.0352
Sudbury, Mass	26	75.2	46.01	22.491	49.00	29,690,000,000	81,366,000	1.670	0.0362
Croton, N. Y.	19	338.0	45.97	22.760	49.50	135,400,000,000	371,600,000	1.680	0.0365

TABLE VII—*Comparative Daily Stream Flow, 1899 and 1900.*

Watersheds.	Area of watershed.	Maximum Gallons.		Date.	Minimum Gallons.		Date.
		Per day.	Per square mile.		Per day.	Per square mile.	
Perkiomen	152	2,330,556,000	15,350,000	February 5.	8,976,000	59,000	September 12.
Neshaminy	139.3	2,578,760,000	18,500,000	May 19.	3,965,000	28,500	September 28.
Tohickon	102.2	2,080,000,000	20,390,000		1,548,000	15,100	
Wissahickon	64.6	830,350,000	12,855,000				
Schuylkill	1915	14,089,000,000	7,380,000	February 23.			

TABLE VI—*Average Annual Yield of Sundry Watersheds to October 1st, 1901.*

Watersheds.	Period covered, years.	Area in miles.	Average rainfall in inches.	Average rainfall flowing off in inches.	Per cent. flowing off.	Average annual yield in gallons.	Average daily yield in gallons.	Average yield in cubic feet per second per square mile of drainage area.	Average yield in cubic feet per second per square mile of drainage area for each inch of rainfall.
Perkiomen, at Frederick.	18	152.	47.207	22.611	47.900	59,725,230,000	163,600,000	1.6654	0.0350
Neshaminy, below Forks.	18	139.3	47.630	22.324	46.870	54,039,900,000	148,081,000	1.6440	0.0345
Tohickon	18	102.2	48.660	27.253	56.007	48,402,890,000	132,492,150	2.0060	0.0412
*Wissahickon									
Schuylkill	3	1,915.	45.601	19.768	43.35		1,799,131,000	1.4535	0.0302
Sudbury, Mass	26	72.5	46.01	22.491	49.0	29,899,000,000	81,366,000	1.670	0.0362
Croton, N. Y.	19	338.0	45.97	22.760	49.50	135,400,000,000	371,600,000	1.680	0.0365

*See TABLE VIII.

TABLE VII—*Comparative Daily Stream Flow, 1900 and 1901.*

Watersheds.	Area of watershed.	MAXIMUM GALLONS.		Date.	MINIMUM GALLONS.		Date.
		Per day.	Per square mile.		Per day.	Per square mile.	
Perkiomen	152.	3,048,465,000	20,055,000	March 11th...	7,555,000	50,000	July 7th.
Neshaminy	139.3	2,987,715,000	21,500,000	March 11th...	19,973,000	144,000	July 5th.
Tohickon	102.2	2,166,950,000	21,244,000	March 11th...	1,940,000	19,000	July 26th.
Wissahickon	64.6						
Schuylkill	191.5	16,805,500,000	8,254,000	March 11th...			

APPENDIX F

ANNUAL REPORT

OF THE

Improvement, Extension and Filtration of the Water Supply

FOR THE

YEAR ENDING DECEMBER 31, 1901

Department of Public Works

IMPROVEMENT, EXTENSION AND FILTRATION OF THE WATER SUPPLY

Bureaus of Water and Surveys

OFFICERS--1901

Chief Bureau of Water,
FRANK L. HAND.

Chief Engineer, Bureau of Surveys,
GEORGE S. WEBSTER.

Consulting Engineer,
JOHN W. HILL.

First Assistant Engineer in Charge,
SAMUEL TOBIAS WAGNER.

Assistant Engineers,

Richard I. D. Ashbridge, in charge of Torresdale Conduit.
Frank R. Fisher, in charge of Lower Roxborough Filters.
La Monte Lloyd, in charge of Belmont Filters.
Stephen Harris, in charge of Upper Roxborough Filters.
Fred. Schaffhauser, in charge of Distribution Pipe Lines.
Fred. C. Dunlap, in charge of Torresdale Filters.
John H. Gregory, in Charge of Plans.
Morris Knowles, in charge of Testing Station to September 1.
Charles Gilman Hyde, in charge of Testing Station since September 1, 1901.

Assistant to Consulting Engineer,
HENRY C. HILL,

Clerk and Stenographer—J. William Lee.
Stenographer—Howard L. Klotz.

ANNUAL REPORT

OF THE

IMPROVEMENT, EXTENSION AND FILTRATION OF THE WATER SUPPLY

FOR THE

YEAR ENDING DECEMBER 31, 1901

Philadelphia, January 1, 1902.

WILLIAM C. HADDOCK, ESQ.,
Director, Department of Public Works.

DEAR SIR:—We have the honor to submit the following report on the work connected with the Improvement, Extension and Filtration of the Water Supply for the year ending December 31, 1901.

Financial.

Total fund provided for the Improvement of the Water Supply is $15,700,000, of which amount $1,200,000 is in bonds unsold and retained as a fund from which to pay the sums awarded by jury for real estate taken in pursuance of the work, leaving an available fund of $14,500,000 for the payment of estimates on the several contracts, and to meet the expenses of the special engineering and clerical staff in charge of the work.

Of the last mentioned sum $1,015,556.12 has been expended by the Bureau of Water for improvements not detailed in this report, leaving an available balance for

contracts originating in this office and maintenance of special engineering staff of $13,484,443.88.

From the inception of the work in February, 1900, to December 31, 1901, charges against the Improvement fund for salaries, inspection, wages, supplies, engineering instruments, stationery, printing and expenses have been $200,385.22.

The amounts paid on completed contracts, and the unexpended balance on contracts in force aggregate $5,367,964.86, which, added to the amounts embraced in the payments made by the Bureau of Water not upon contracts originating in this office and charges for the maintenance of special engineering staff $6,583,906.20, leaving the balance in the Improvement Fund of $7,916,093.80.

Contracts have been awarded, but not executed, aggregating $6,300,000, leaving the net available balance $1,616,093.80.

Progress.

Plans and specifications have been prepared, bids received, and contracts awarded for the following work:

Filter Plants.

Contract Number.	Location.	Number of Filters.	Net capacity at a 3,000,000 gallon rate.
10	Lower Roxborough	5	6,000,000 gallons.
12	Upper Roxborough	8	15,000,000 gallons.
16	Belmont	18	33,000,000 gallons.
25	Torresdale	55	100,000,000 gallons.
	Total	86	154,000,000 gallons.

Reservoirs.

Contract Number.	Location.	Capacity.
16	Belmont (subsiding)	73,000,000 gallons.
27	Oak Lane (Compensating)	70,000,000 gallons.
	Total	143,000,000 gallons.

Filtered Water Basins.

Contract Number.	Location.	Capacity.
10	Lower Roxborough Filter Plant ..	3,000,000 gallons.
12	Upper Roxborough Filter Plant ..	8,000,000 gallons.
16	Belmont Filter Plant	16,500,000 gallons.
25	Torresdale Filter Plant	50,000,000 gallons.
	Total	77,500,000 gallons.

Pumping Engines, etc.

Contract Number.	Location.	Capacity.
11	Lardner's Point (High Service) ..	60,000,000 gallons.
18	Upper Roxborough (Low Service) .	30,000,000 gallons.
	Total	90,000,000 gallons.

Filtered Water Conduit.

Contract Number.	Location.	Capacity, 24 hours.
14	Torresdale to Lardner's Point	300,000,000 gallons.

Distribution Mains, etc.

Contract Number.	Location.	Tonnage.	Total length.
17	See detail contract.....	16,553.6	22.0 miles.
19	See detail contract	7,655.7	9.0 miles.
	Total	24,208.3	31.0 miles.

General.

Contract Number.	Description.
13	Rotary Stop Valves.
21	Low Service Pumping Station, Upper Roxborough Filters.
22	Hand Traveling Crane for Low Service Pumping Station, Upper Roxborough Filters.
24	Filtering materials for Upper and Lower Roxborough Filters, and Sand Washers for Lower Roxborough Filters.
26	Testing Station at Torresdale.

Plans and specifications have also been prepared for the following work, none of which has been advertised for except Contract No. 20.

Contract Number.	Description.
20	**Triplex Pumps and Gasoline Driving Engines for Sand Washers at Upper Roxborough Filters.**
23	**Pumping Station for Sand Washing Machinery, Upper Roxborough Filters.**
28	**Lardner's Point Distribution System.**
29	**Reconstruction of Wentz Farm Reservoir.**
30	**Lardner's Point Pumping Station.**

The work accomplished by the office force during the year consists of five hundred and nineteen (519) finished drawings, twenty-six (26) drawings in progress, and sixty-two (62) studies. Specifications with their accompanying plans have been prepared for twenty-five (25) contracts, and seven (7) public lettings have been held for the receipt of bids.

Work has been started in the field on fourteen (14) contracts, and a considerable amount of work has been accomplished as is shown in the detailed report.

The work on the Lower Roxborough Filters, as well as the new distribution mains to supply the filtered water to Manayunk and the lower Germantown District, is rapidly nearing completion, and it is hoped that at a very early date filtered water will be supplied to these districts.

Work is also progressing satisfactorily at the Belmont Plant for supplying West Philadelphia, and we believe that this work will be nearly completed during the year 1902.

The following figures showing the general quantities of the most important items on contracts under construction are given in order to show the progress which has been made during the year ending December 31, 1901.

Items.	Excavation, cu. yds.	Embankment, cu. yds.	Puddle Lining, cu. yds.	Concrete, cu. yds.	Water pipe laid, tons.
Lower Roxborough Filters.	60,785	23,921	7,889	12,560	268.37
Upper Roxborough Filters.	119,149	16,500	4,845	1,984	672.10
Belmont Filters.....	250,578	119,186	195	278	482.00
Distribution Pipe Lines.....	65,051	.....	.....	.....	8,091.70
Total.....	495,561	159,607	12,929	14,822	9,509.17

Testing Stations.

The investigations being made at the Testing Stations, at Spring Garden and Torresdale, have proved to be of very great value in furnishing data by which we can now well know the peculiar physical, chemical and biological characteristics of the waters of the Schuylkill and Delaware rivers. It has been clearly shown that the Delaware river at the Torresdale Testing Station is far superior to the Schuylkill river at Spring Garden in the quality of its water. This superiority is due to the smaller amounts of turbidity, bacteria, chlorine and organic matter in the Delaware river water.

The work has been of great interest also on account of the experiments which have been made to ascertain the expediency of using a rate of filtration in excess of that customarily used by specially preparing the water by preliminary treatment in a rough filter, or by continuous sedimentation, thus not only increasing the total amount of water filtered per acre, but also increasing the runs of the filters during times of excessive turbidity of the raw water. It is proposed to introduce preliminary filters for the plants at Belmont, Lower Roxborough and Torresdale.

Experiments have also been conducted with filtering sands of various kinds, nearly all of which are obtainable from nearby points. These experiments have shown that with very little care it is possible to procure a great variety of sands, any of which would be suitable.

Experiments have also been made to determine the merits of placing an artificial "schmutzdecke" of asbestos on top of the sand layer.

A general idea of the amount of analytical work can be obtained from the following record of the number of analyses made.

Regular chemical samples	7,340
Individual determinations on chemical samples	26,350
Regular bacteriological samples	19,150
Determinations of B. Coli Communis	1,040
Chemical and mechanical analyses of sand and gravel	1,560

Appropriation of Land.

Condemnation proceedings have been instituted and the City has acquired possession of the tracts of ground recommended by the Commission of Experts at the Upper Roxborough Reservoir, on Port Royal avenue; at the Belmont site in West Philadelphia, at Belmont and City avenues, and on the Delaware River below Torresdale. Ordinances have also been passed and approved to acquire relatively small tracts of land at Shawmont for the purpose of enlarging the coal storage, and at Lardner's Point for the Pumping Station to distribute the filtered water from the Torresdale Filters. An ordinance has been introduced to repeal the taking of the ground at the Queen Lane Reservoir recommended by the experts. It is proposed to install at the Torresdale Station as much of the capacity of the proposed Queen Lane Filters as may be needed.

Proceedings have also been instituted to acquire a tract of land near Oak Lane Station, in the Twenty-second Ward, to construct a compensating basin for the Torresdale distribution.

The plans as now agreed upon call for the abandonment of the Queen Lane and East Park Filter Plants, as recommended by the experts, and the concentration of the necessary filter capacity at Torresdale.

The detail work which has been accomplished in design and construction during the current year is set forth hereafter in this report.

Legislation.

During the current year the following Ordinances relating to the work of the Improvement, Extension and

Filtration of the Water Supply were passed by Councils and approved by his Honor, the Mayor.

1st. An Ordinance approved February 13, 1901, authorizing the revision of lines and grades of portions of the City plans in the Twenty-first, Forty-first, Thirty-eighth and Twenty-fourth Wards required to facilitate the construction of the reservoirs, filter beds and other work.

2d. An Ordinance approved March 28, 1901, authorizing the laying of water pipe and conduits on unopened streets and through private property. The lines covered are those of the new mains from the Lower Roxborough Filters to Manayunk and Germantown, of the new high service line to Chestnut Hill and Mt. Airy, and for the conduit to carry filtered water from the Torresdale Filters to the pumping station at Lardner's Point.

3d. An Ordinance approved April 2, 1901, authorizing the opening of Overbrook avenue in the Twenty-fourth Ward in connection with the Upper Belmont Reservoir.

4th. An Ordinance approved July 13, 1901, repealing the portion of the Ordinance approved June 22, 1900, relating to the appropriation of certain tracts of land in the Thirty-eighth Ward, and the repealing of an Ordinance approved November 20, 1900, relating to the appropriation of certain other tracts of land in the same ward. The reasons for the repeal of these Ordinances are as follows: The Board of experts appointed by His Honor, the Mayor, recommended the appropriation of this ground adjacent to the site of the Queen Lane Reservoir. The water from this plant would have served the present Queen Lane Distribution District; further and more exhaustive studies have shown that it is better to supply this district from the Torresdale Filter Plant and the Pumping Station at Lardner's Point, and that it can be done at very much less expense. Also, that the money that would have been applied for purchasing

land at Queen Lane, and for installing the works at that point, could be used at Torresdale and Lardner's Point to better advantage than at the Queen Lane site.

5th. An Ordinance approved July 13, 1901, authorizing the appropriation of a certain tract of ground in the Twenty-second Ward for the purpose of constructing a reservoir to be known as the Oak Lane Reservoir. This reservoir was designed, and the ground selected, with a view to obtaining an elevation sufficient to supply and to fix the pressure for the present Queen Lane, East Park, Fairmount and Corinthian Distribution Districts, and also to serve as a compensating basin for the Lardner's Point Pumping Service.

6th. An Ordinance approved July 13, 1901, amending the Ordinance of March 15, 1900, in reference to the creation of a loan of $12,000,000 by allowing a rate of interest not exceeding three and one-half (3½) per cent. per annum (for a portion of the loan) in place of three (3) per cent. as originally provided for.

Contracts.

Contract No. 1.

TESTING STATION AND ANNEX. Completed in 1900.

Contract No. 2.

REFRIGERATING MACHINERY. Completed in 1900.

Contract No. 3.

FILTER SAND AND GRAVEL FOR USE IN BEDS AND TANKS AT THE TESTING STATION.

On July 23, 1900, the contract was awarded to Norcross & Edmunds, Philadelphia. Contract limit, twenty-five

hundred ($2,500) dollars. Contract price held good until July 20,1901. Total payments made, one thousand sixteen (1,016) dollars and fifty-four (54) cents.

Contract No. 4.

PLATINUM WARE FOR ANALYTICAL WORK. Completed in 1900.

Contract No. 5.

DIAMOND DRILL BORINGS.

The work under this Contract consisted in making borings along the line of the proposed gravity conduit from the clear water reservoir at Torresdale to the pump wells at the Frankford Pumping Station, and upon the proposed sites for the subsiding reservoirs, filters, clear water reservoirs, pumping stations, etc.

The borings in the drift were made through a hole cased with a four (4) inch drivepipe. This method was followed until the rock was reached, when a diamond drill was used, producing a core two and one-quarter ($2\frac{1}{4}$) inches in diameter. Besides ascertaining the character of the drift and rock the contract provided for temporary sealing of the hole at various depths, and noting the rate of inflow of sub-soil and rock water.

Date of receipt of bids, August 7, 1900.

Award made to Flaghouse & Beason, Philadelphia, August 8, 1900.

Contractor ordered to begin work, September 12, 1900.

Time, four (4) months.

Contract time expired, January 12, 1901.

Contractor began work, September 18, 1901.

Contractor finished work, February 27, 1901.

Limit of contract, ninety-seven hundred and fifty ($9,750) dollars.

Final payment, March 9, 1901.

Total amount paid Contractor, eighty-eight hundred thirty-three dollars and thirty cents ($8,833.30).

Seventeen (17) holes were drilled through the drift and rock on the line of the conduit, which were on an average ninety-three and three-tenths (93.3) feet deep. A total of five hundred thirty-six and seven-tenths (536.7) feet through drift, and one thousand fifty-one and six-hundredths (1,051.06) feet in rock.

On the site of the reservoir at the Belmont Filter Plant four (4) holes were drilled, making a total of twenty-seven (27) feet through drift and twenty-six and two-tenths (26.2) feet through rock.

Contract No. 6.

PLATINUM WARE, TESTING STATION.

The work under this contract consists in furnishing eight (8) platinum dishes and other platinum ware for the Testing Station. Bids were received on November 13, 1900, but the work was re-advertised on December 12, 1900, at which time the contract was awarded to Arthur H. Thomas Company, Philadelphia. Amount of bid, four hundred forty-four dollars and ninety-five cents ($444.95). The articles were delivered and final payment made on February 6, 1901. Total amount paid Contractor, four hundred forty-four dollars and ninety-five cents ($444.95).

Contract No. 7.

LOWER ROXBOROUGH FILTERS. Contract not awarded. See report of 1900. Re-advertised as contract No. 10.

Contract No. 8.

EXPERIMENTAL SAND EJECTOR.

The work under this contract consists in furnishing materials and apparatus for setting up a Sand Ejector adjacent

to the Pumping Station at Shawmont to make experiments upon various sizes and kinds of nozzles and throats for washing and transporting sand under various pressures. The data was required in connection with the design of sand washers, and of the apparatus for handling sand in and about the various filter plants.

Bids were asked for this contract on December 12, 1900, but none were received. On February 11, 1901, one bid was received but no award was made. On April 17, 1901, bids were again received and award was made to Patrick Gormly, Philadelphia. The Contractor was ordered to begin work on May 7, 1901. The work was completed and final payment made August 7, 1901. Time for completion, sixty (60) days. Limit of contract, eighteen hundred ($1,800) dollars. Total payment made Contractor, seventeen hundred twelve dollars and three cents ($1,712.03).

Upon completion of the work the experiments were at once begun under the supervision of the Engineers, and with labor furnished by the Bureau of Water.

Contract No. 9.

Extension of Pipe System.

The work advertised for under this contract consisted in furnishing, delivering and laying certain lines of distribution mains, with their valves, stop boxes and other appurtenances. The bids asked for were embraced under five (5) separate proposals, hereafter described. The pipe lines are lettered from "A" to "J" inclusive, omitting "I," and are located as follows:

Line "A."—From the clear water basin on Dearnley avenue, (Lower Roxborough Filters) on Fowler street, Domino lane, Silverwood street, Hermitage street, Pechin street, Walnut lane, Wissahickon avenue, Chelton avenue, Greene street, Coulter street, Germantown avenue, Baynton street, Penn street, Chew street, Stenton avenue,

Thorps lane, Berkley street, West Logan street, Germantown avenue and East Logan street.

Line "B."—From the clear water basin on Dearnley avenue (Lower Roxborough Filters), on Fowler street, Domino lane, Silverwood street, Leverington street, Green lane, Cotton street and Terrace street.

Line "C."—On Ridge avenue, Rex avenue, through Fairmount Park, Rex avenue and Germantown avenue to Hartwell avenue.

Line "D."—On Frank street from Wissahickon avenue to Greene street, on Johnson street, Morton street, East Washington lane and Chew street.

Line "E."—On Sixth street from York street to Susquehanna avenue; on Susquehanna avenue to Fourth street.

Line "F."—On Girard avenue from Front street to Eleventh street.

Line "G."—On Twelfth street from Girard avenue to Spring Garden street.

Line "H."—On Broad street from Callowhill street to Vine street.

Line "J."—On Broad street from York street to Arch street.

The proposals were as follows:

No. 1.—Cast Iron Water Pipe, Special Castings, Excavating Water Pipe Trenches and Pipe Laying for Pipe Lines "A" to "J" inclusive and pipe about the Lower Roxborough Reservoir.

No. 2.—Cast Iron Water Pipe and Special Castings, Excavating Water Pipe Trenches and Pipe Laying for Pipe Lines "A" to "D" inclusive, and pipe about the Lower Roxborough Reservoir.

No. 3.—Cast Iron Water Pipe and Special Castings, Excavating Water Pipe Trenches and Pipe Laying for Pipe Lines "E" to "J" inclusive.

No. 4.—Cast Iron Water Pipe and Special Castings, and

Flange Pipe and Special Castings for the Lower Roxborough Filters, and for Hydrant Connections and Miscellaneous Pipe.

No. 5.—Stop Valves, Check Valves, Indicator Stands, Extension Stems, Stop Boxes, Frames and Covers.

Bids were received for this work on February 11, 1901. On February 20th the work on Pipe Lines "A" to "J" inclusive, with the water pipe about the Lower Roxborough Reservoir, was awarded to Daniel J. McNichol, Philadelphia. Owing, however, to injunction proceedings instigated by Ryan & Kelley in C. P. Court No. 2, this work was readvertised under Contract No. 17

Award was made to J. Alfred Clark, Philadelphia, for the Stop Boxes, Frames and Covers (see Contract No. 9-A), under Proposal No. 5, to the Eddy Valve Company, Waterford, N. Y., for the Valves, etc., (see Contract No. 9-B), under Proposal No. 5, and to Daniel J. McNichol, Philadelphia, for the Cast Iron Water Pipe, Special Castings, etc., (see Contract No. 9-C), under Proposal No. 4.

Contract No. 9-A.

The work under this contract consisted in furnishing the Stop Boxes, Frames and Covers required for Pipe Lines "A" to "J" inclusive, described under Contract No. 9. Bids were received on February 11, 1901, and contract awarded to J. Alfred Clark, Philadelphia, on February 28th. The Contractor was ordered to begin work on May 13th. Time, three (3) months. Limit of contract, twenty-one hundred ($2,100) dollars. The work under this contract has been completed. Date of final payment, December 21, 1901. Total amount paid Contractor fifteen hundred sixty-three dollars and eighty cents ($1,563.80).

Contract No. 9-B.

The work under this contract consisted in furnishing and delivering the Stop Valves, Check Valves, Indicator

Stands and Extension Stems required for Pipe Lines "A" to "J" inclusive, and for the Lower Roxborough Filters, Proposal No. 5, Contract No. 9.

Bids were received February 11, 1901.

Contract awarded on March 18, 1901, to Eddy Valve Company, Waterford, N. Y.

Contractor ordered to begin work May 6, 1901.

Time, Line "A" 3 months; Line "B" 2 months; Line "C" 4 months; Line "D" 1 month; Line "E" 1 month; Line "F" 2 months; Line "G" 1 month; Line "H" 1 month; Line "J" 5 months; Lower Roxborough Filters, Stop Valves, 2 months; Lower Roxborough Filters, Check Valves, 1 month.

The work under this contract has been completed.

Limit of contract, seventeen thousand ($17,000)) dollars.

Final payment made December 20, 1901.

Total payment made Contractor, fourteen thousand four hundred three dollars and six cents ($14,403.06).

Work inspected by R. W. Hunt & Company.

Contract No. 9-C.

The work under this contract consisted in furnishing and delivering the Cast Iron Water Pipe and Special Castings for the Lower Roxborough Filter Plant, and for Hydrant Connections and Miscellaneous Pipe connected with the Distribution Pipe Lines.

Proposal No. 4, Page 37, etc., Contract No. 9.

Bids were received February 11, 1901.

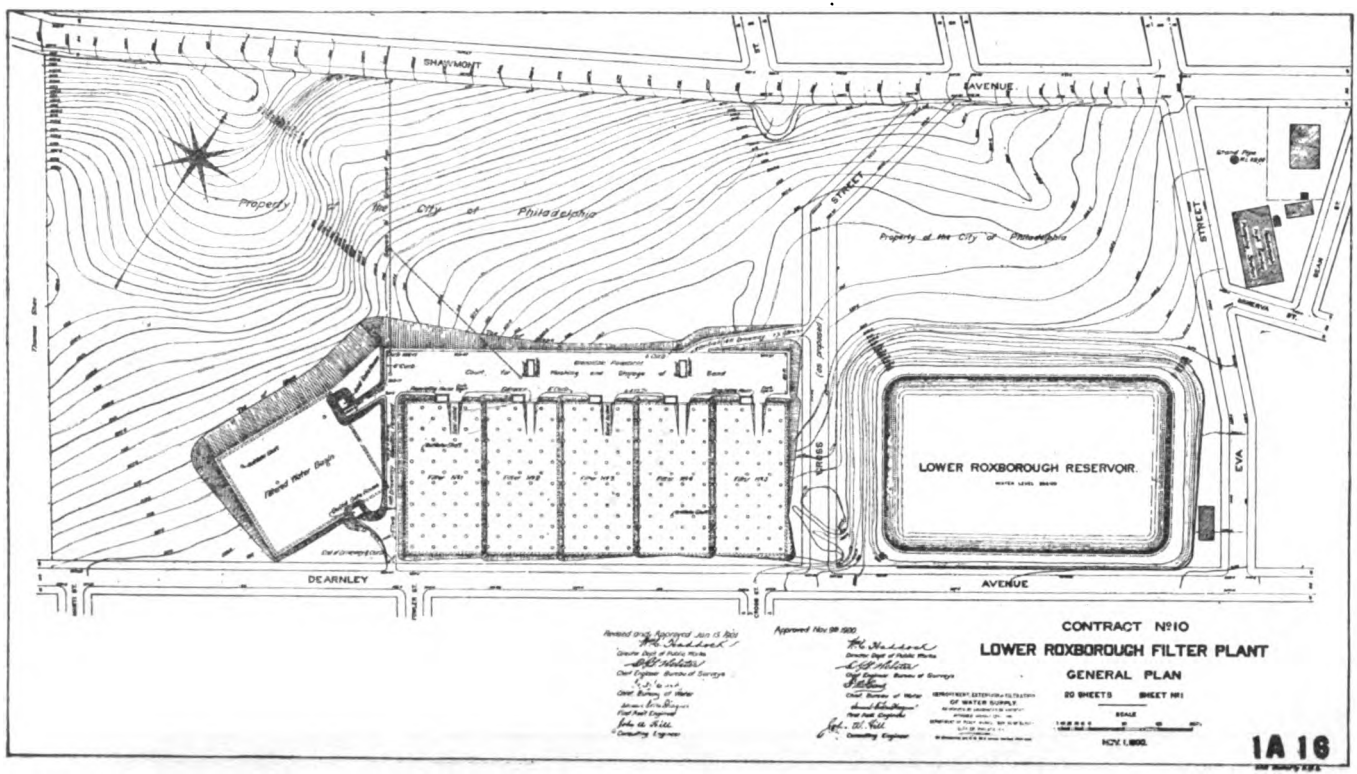
Contract awarded March 18, 1901, to Daniel J. McNichol, Philadelphia.

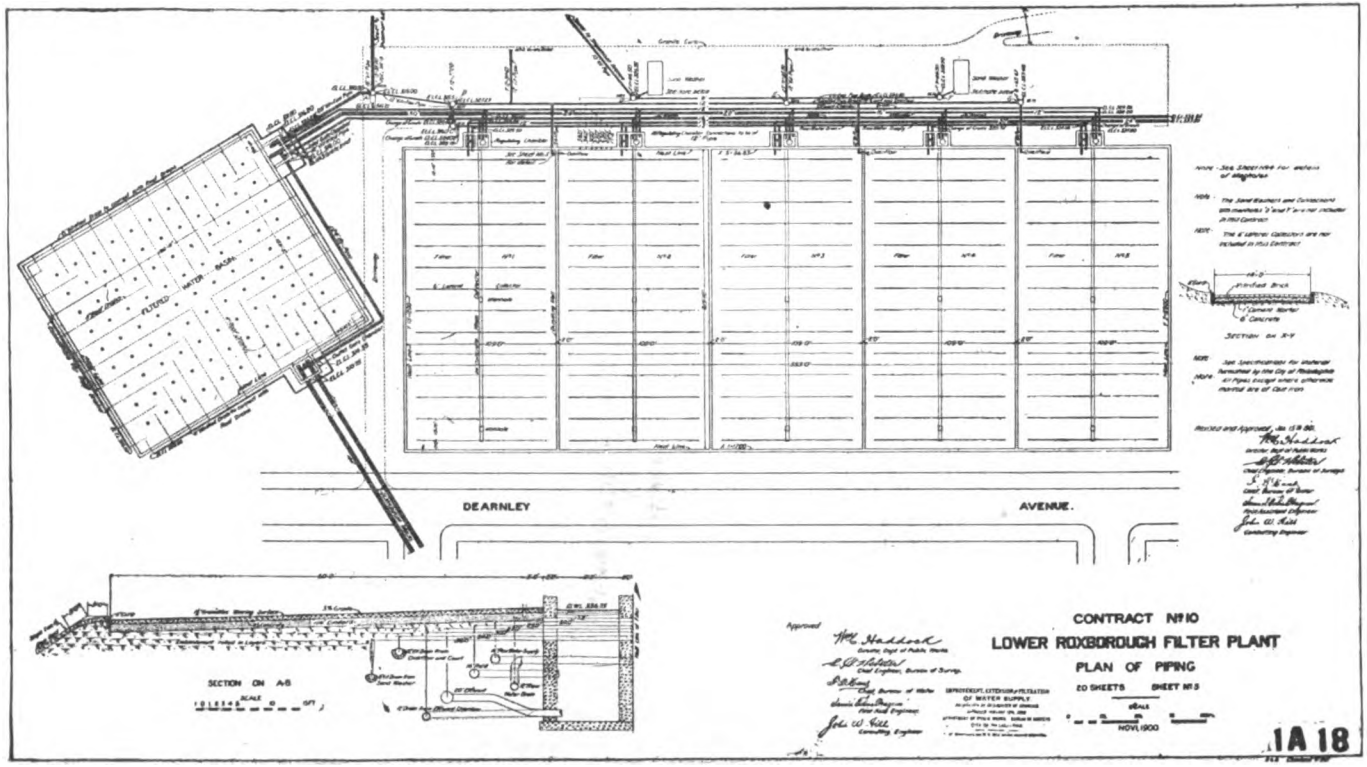
Contractor ordered to begin work May 15, 1901.

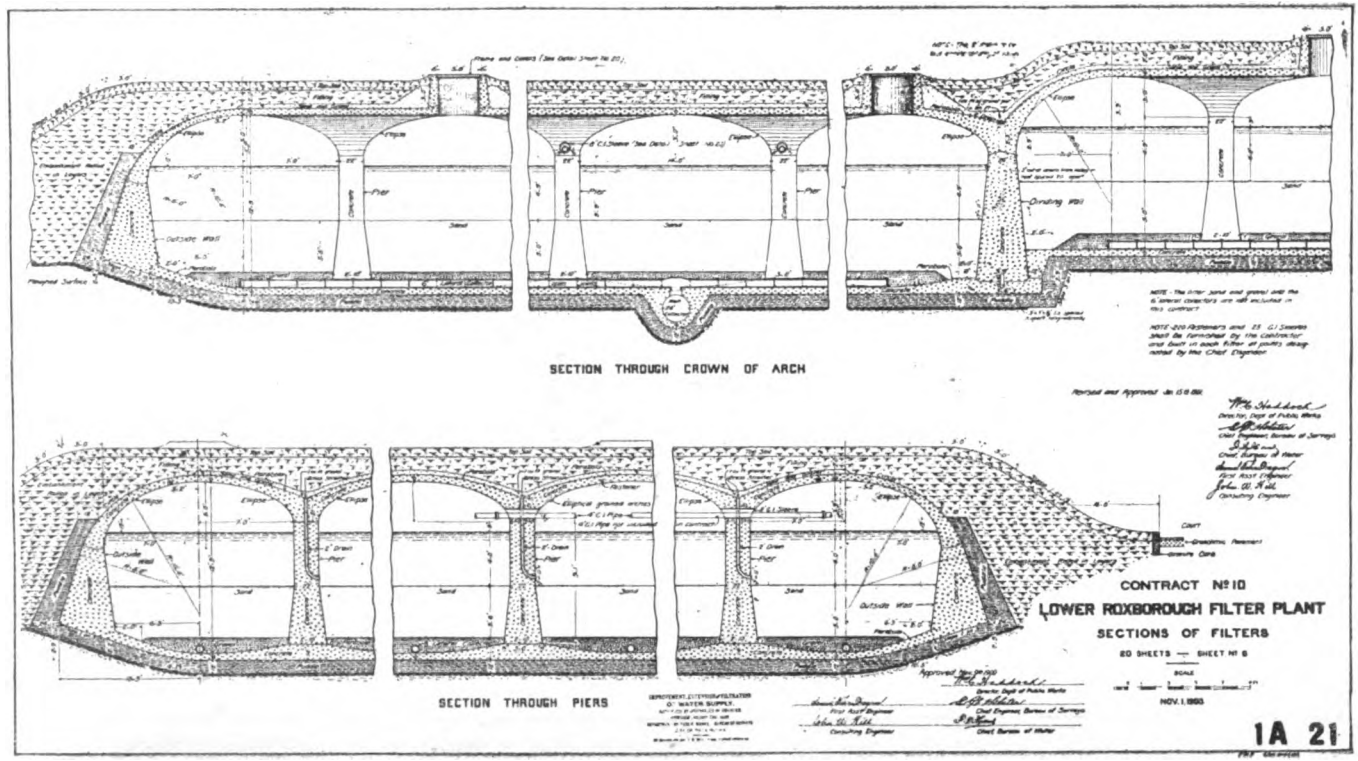
Time, two (2) months.

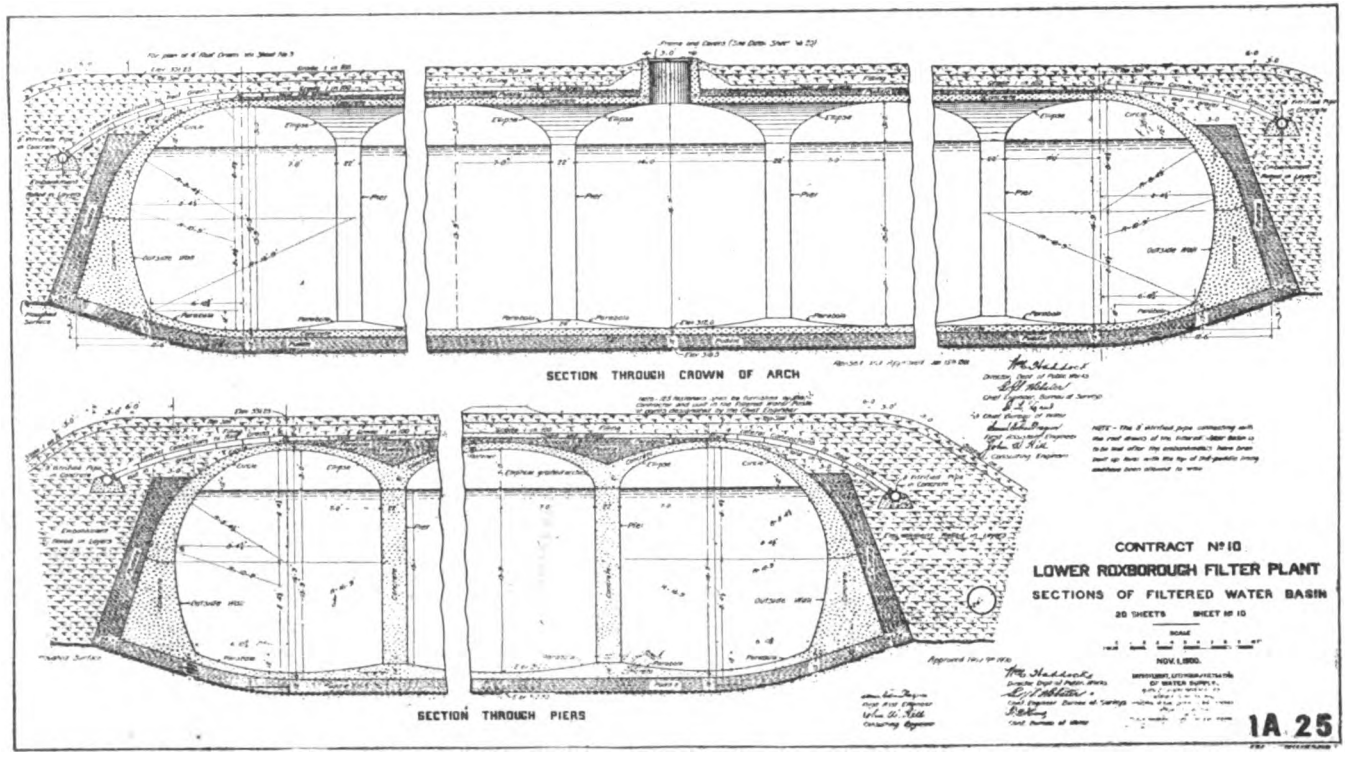
Contract time expired July 15, 1901.

Limit of contract seven thousand five hundred ($7,500) dollars.









Final payment made December 20, 1901.

Total payment made Contractor, seventy-four hundred eighty-eight dollars and fourteen cents ($7,488.14).

The work was inspected by the regular corps of Inspectors of the Bureau of Water.

Contract No. 10.

Lower Roxborough Filters.

The work under this contract consists of a Filter Plant with a nominal capacity of six (6) million gallons per day, situated adjacent to the Lower Roxborough Reservoir in the Twenty-first Ward. The work was advertised under Contract No. 7, in 1900, but no award was made, and the plans were modified with respect to the Regulating and Gate Houses and the work re-advertised as Contract No. 10.

The water supplying the plant will be taken from the Schuylkill river at Shawmont. The old reservoir, which has a capacity of 12,800,000 gallons at an elevation of 366 feet above City datum, will be utilized as a sedimentation basin. The water will then be drawn off and supplied to the filters immediately adjacent at a lower level. After having been filtered the purified water will pass to the filtered water basin, and will then be delivered through two (2) thirty (30) inch distributing mains to Manayunk and a low level district in Germantown.

In case of very turbid conditions of the river when the amount of sedimentation provided by the Lower Roxborough Reservoir is not sufficient connections have been provided whereby sedimentated water can be drawn from the Upper Roxborough Reservoir.

The plant consists of five (5) covered filters, with a court for the storage and washing of filter sand, and a covered filtered water basin. Owing to the topography of the ground it was found necessary to locate the filters

in a series of steps, the difference in level between two adjacent filters being 2 feet 9 inches. The filtered water basin is located at a still lower level.

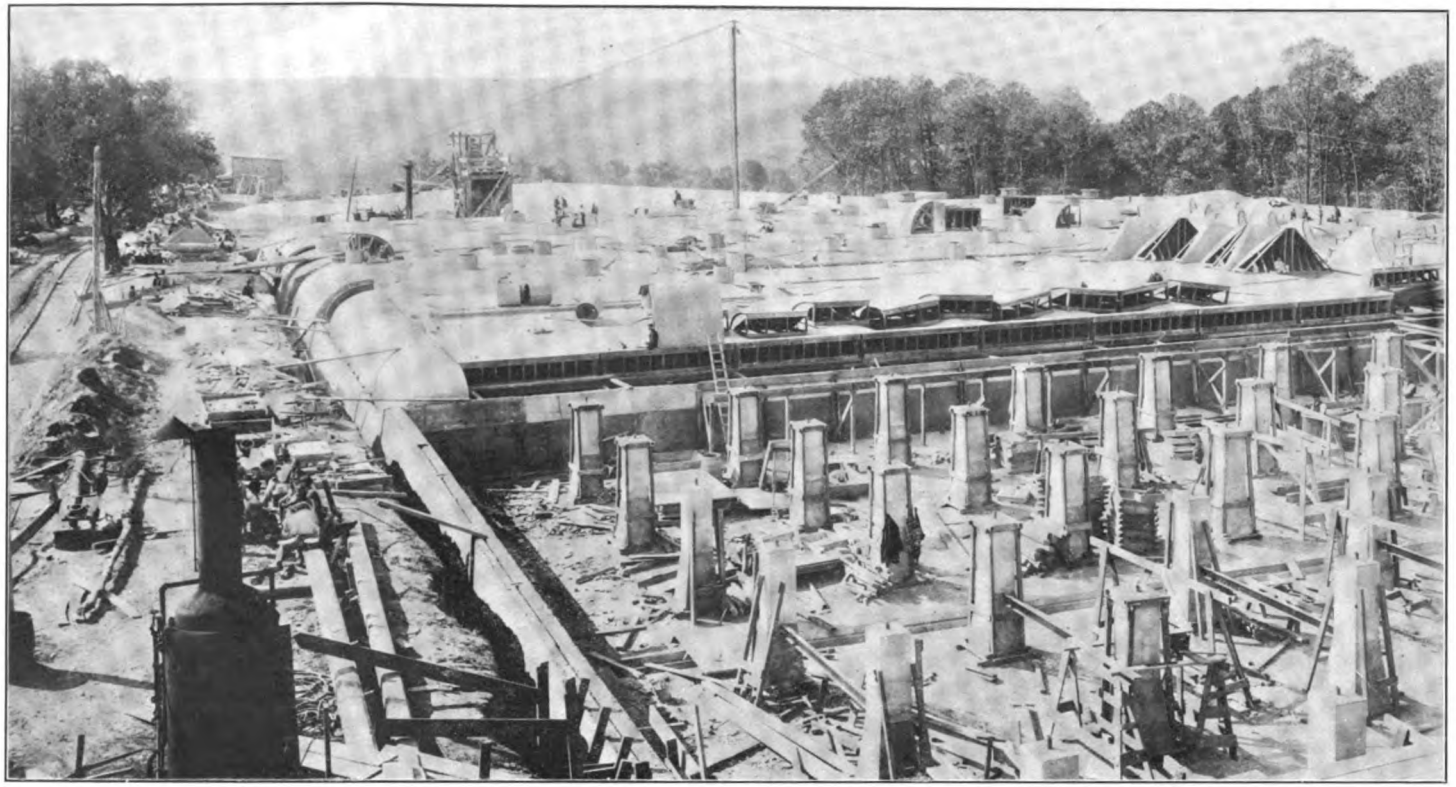
Each filter measures 109 feet by 219 feet 10 inches on the neat lines, and has a net filtering area, at the normal sand line, of about 23,400 square feet, or 0.537 acre. Assuming a nominal rate of filtration of 3,000,000 gallons per acre per 24 hours, each filter will yield about 1,600,000 gallons per 24 hours, or with four (4) filters in service the capacity of the plant will be about 6,400,000 gallons per 24 hours.

In general type of construction the filters are similar to those in use in Berlin, Warsaw, St. Petersburg and other large cities of Continental Europe, and also to those in the filtration plant at Albany, N. Y., excepting in the materials of construction.

The floors of the filters are built of concrete in the form of inverted groined arches, six (6) inches thick at the center and fourteen (14) inches thick under the piers, and on a puddle lining. The puddle lining consists of a mixture of clay and broken stone, and is carried up around the outside walls to a point above the water line of the filters.

The piers are built of concrete, and each pier is built as a monolith. They are probably the first instance of such construction being adopted for filters in this country. The dividing walls are also built of concrete, and they are constructed in sections of such length that each section is a monolith.

The exposed faces of the piers, and of the outside and dividing walls, below the sand line, are floated with a thin plaster of Portland cement, mixed three to one, and dashed with sand before the plaster has set. This will afford a rough surface for the sand to press against and will tend to prevent a downward filtration of the water along these surfaces.



LOWER ROXBOROUGH FILTERS. OCTOBER 21, 1901.

LOWER ROXBOROUGH FILTERS. NOVEMBER 18, 1901.

The vaulting is built of concrete in the form of semi-elliptical groined arches, fourteen (14) feet span, three (3) feet rise, six (6) inches thick at the crown, and twenty-one (21) inches thick over the piers. Ventilator shafts are provided for the admission of light and air during scraping. On top of the vaulting is placed a layer of broken stone four (4) inches thick for the purpose of conveying rain water to the drains leading down through the piers and dividing walls to a point just above the sand level.

The twenty-four (24) inch main collector drains, extending the entire length of each filter, are built entirely of concrete, and are covered with movable concrete slabs for convenience and inspection during operation. The six (6) inch lateral collectors will enter this drain at the top through special terra-cotta fittings.

No filtering materials are included in the contract for the construction of the filters, pending further investigations to be made at the Testing Stations.

Each filter is provided with a sand incline and run for the purpose of removing the dirty sand, and for the replacing of washed sand.

The filtered water basin is similar in construction to the filters, except that it is deeper, and the piers are twenty-two (22) inches square their entire heighth. The capacity of the basin at the water line is three million (3,000,000) gallons, or about one-half ($\frac{1}{2}$) day's nominal work of the filters. On top of the vaulting is placed a layer of puddle, filling up the depressions over the piers, with its top surface graded from a high point at the center of the basin to the four sides. On this puddle is placed a layer of broken stone, and in this four (4) inch drains with open joints are laid to collect the rain water and lead it to the eight (8) inch pipe around the basin and connecting with the overflow.

The pipe supplying raw water to the filters will be connected with the reservoir which serves as the sedimentation basin at a point opposite to where the water is admitted. The main effluent pipe with its branches leading from the effluent chambers conducts the filtered water to the filtered water basin. The raw water drain serves to draw off the four-foot depth of water above the sand prior to scraping, and, by reason of the filters being stepped, arrangement has been made to drain this water from the higher filters to the lower ones. A connection has also been made to the fifteen-inch storm water sewer leading to Shawmont avenue, so that the lowest filter can be drained.

The effluent chamber drain removes from the effluent chamber the last water filtered which is obtained just before scraping, by allowing the water level in the filter, after the raw water has been drained off, to drop a few inches below the top of the sand. This drain connects with the filtered water basin, and also with the storm water sewer, in order to waste this water if it is found desirable to do so.

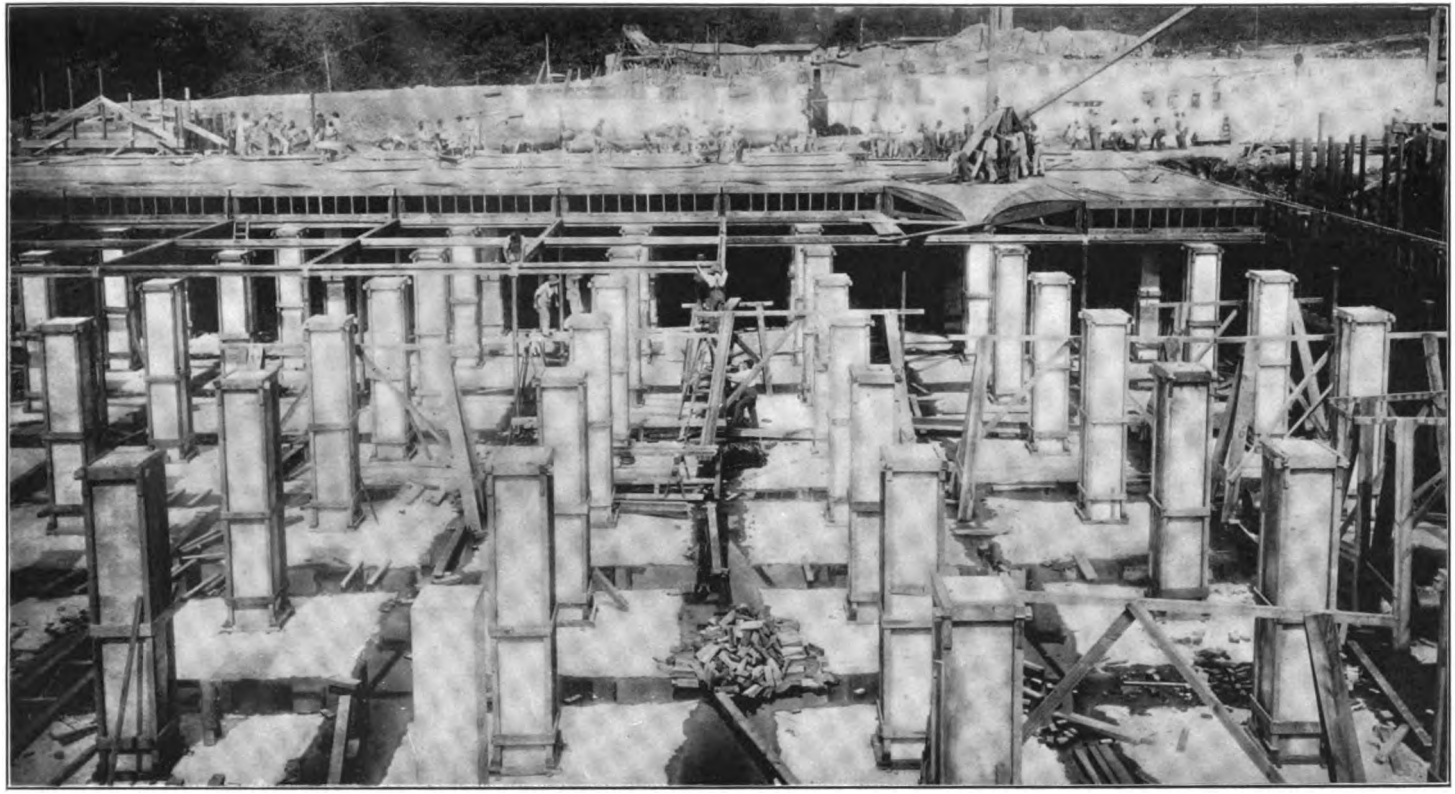
The overflow and court drain leading to the storm water sewer is connected with the overflow from the filters, and also with the inlet basins in the court to remove rain water. A drain connecting with the sand washers only has been provided to take the dirty wash water and carry it to one of the intercepting sewers in Shawmont avenue.

The refilling pipe has a connection with each of the effluent chambers in order to provide filtered water from one filter for refilling another filter immediately before starting a run. This pipe, at its lower end, is connected with the inlet gate chamber of the filtered water basin, and at its upper end it is to be extended to the present high service standpipe, about a quarter of a mile distant, which will receive filtered water from the Upper Rox-

INTERIOR OF FILTER—LOWER ROXBOROUGH FILTERS. NOVEMBER 18, 1901.

LOWER ROXBOROUGH FILTER PLANT. JANUARY 14, 1902.

Sand Entrance and Regulating House, Lower Roxborough Filters. January 14, 1902.



LOWER ROXBOROUGH FILTERS. SEPTEMBER 13, 1901.

borough filters. It will also be connected with the main distributing pipes leading from the upper Station. By this means filtered water under a pressure of 65 pounds will be obtained for running the sand washers; it will also serve for refilling the upper filters, and further, for furnishing an additional supply of filtered water to the filtered water basin in case the water level in the basin is lowered, due to a sudden draft for fire purposes.

The 24-inch by-pass around the filtered water basin affords a means of running the filtered water from the main effluent pipe directly into the distributing mains in case the basin, for any reason, is out of service, or for conducting water from the upper plant directly to the same distributing mains.

The 20-inch pipe leading from the inlet gate chamber of the filtered water basin is connected with a vertical overflow pipe, and will also serve as a blow-off for the basin in case it should be desired to drain off all the water. This pipe discharges into the storm water sewer.

The 30-inch distributing mains leading from the filtered water basin will supply Manayunk and a part of Germantown.

In the regulating chamber a 12-inch effluent pipe will be provided with a regulating valve for controlling the rate of filtration. This consists of a vertical telescoping pipe, the upper edge of which acts as a weir, and is suspended from a float. By this means a constant rate of filtration can be maintained with an increasing loss of head. A wheel stand placed above the telescoping pipe will be furnished with a registering mechanism to indicate the rate of filtration. Gauges will be provided in the regulating house for showing the loss of head on the filter. In the inlet chamber, on the end of the supply pipe which admits raw water to the filter, will be placed a balanced valve with a float for controlling the water level.

An Engineer Corps was put in the field immediately after the award of the contract, and on April 9th ground was broken by the contractor. The excavation was made by means of ploughs and wheeled scrapers, except in the rock, when carts replaced the scrapers.

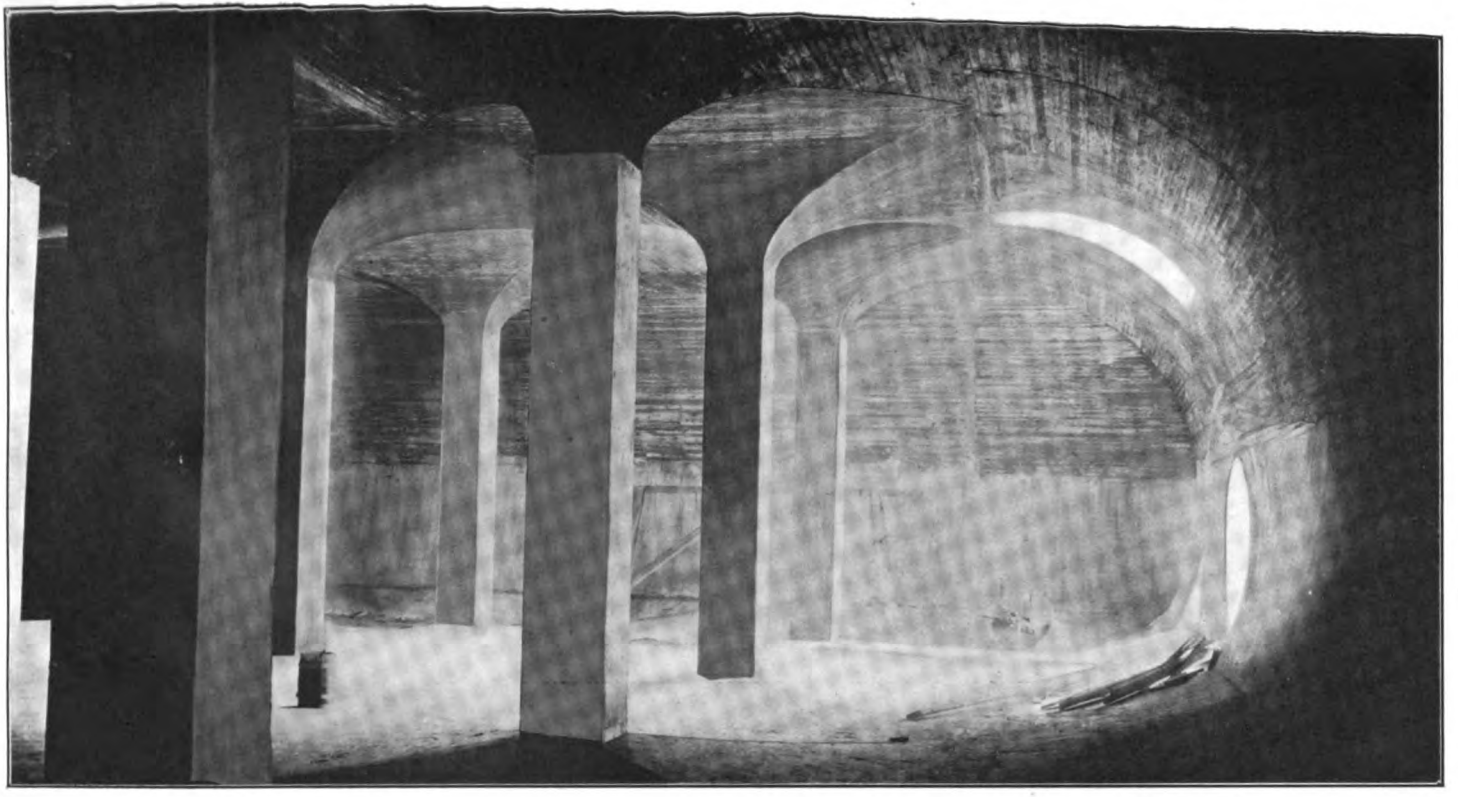
The Contractor constructed a trolley railroad on Shawmont avenue to transport materials from Shawmont Station to the site of the work.

Before any puddle lining was placed tests were made to determine the availability of materials submitted by the Contractor. The results of these tests favored a clay from Swedeland, Penna., which was mixed with broken limestone, graded from ¾ inch to ¼ inch in the proportions of fifty-five (55) per cent. of clay and forty-five (45) per cent. of broken stone.

Two (2) horizontal pug mills were used for mixing the puddle, a ten (10) foot mill from the Wallace Manufacturing Company, and one seven (7) foot mill from the Chambers Brick Machine Co. Both of these were in all respects similar to the ordinary mill used in brick manufacture. The equipment for compacting the puddle consisted of hand and pneumatic rammers, grooved rollers weighing one thousand (1,000) pounds per lineal foot, and one steam asphalt roller weighing five (5) tons. Wherever rolling is impracticable the pneumatic rammers have been used with excellent results.

The concrete plant consists of three (3) cubical box mixers of the Carlin make. Two of these are four (4) foot cubes with a capacity of one (1) cubic yard each, and one a five (5) foot cube with a capacity of two (2) cubic yards. Pneumatic rammers were used during the latter part of the work in ramming the concrete and proved to be a great improvement over the hand method.

The average daily force employed by the Contractor was about 230 men. At the present time the concrete



INTERIOR FILTERED WATER BASIN, LOWER ROXBOROUGH FILTERS. OCTOBER 7, 1901.

work on filtered water basin and all five (5) filters is completed, excepting a few minor details. The drainage and piping system is completed, with the exception of the 30-inch drains from the outlet chamber of the filtered water basin to the end of the distribution lines on Dearnley avenue.

The brick and stone work on three (3) of the regulating houses have been finished. About one-half of the necessary embankments have been completed. The Contractor is now placing the drains on top of the filters.

All of the protecting puddle of the filtered water basin, and Filter No. 1, has been placed. On the remaining filters it is nearing completion. Fifty-eight (58) working plans have been prepared by the force in the field.

Date of receipt of bids, February 20th, 1901.

Award made to Daniel J. McNichol, Philadelphia, February 20th, 1901.

Contractor ordered to begin work, April 1st, 1901.

Time, five (5) months.

Contract time expired, September 1st, 1901.

Contractor began work, April 9th, 1901.

Limit of contract, two hundred fifty thousand (250,000) dollars.

Total payment made Contractor, one hundred fifty-two thousand one hundred and twenty dollars and twenty-eight cents ($152,120.28).

Assistant Engineer in Charge, Frank R. Fisher. Second Assistant Engineer, Glenn D. Holmes. Inspectors, Joseph G. Moore, William Connor, Alexander Fillis.

The steel work is being inspected by J. A. Colby.

Contract No. 11.

HIGH SERVICE PUMPING MACHINERY, LARDNER'S POINT.

The work under this contract consists of furnishing and erecting at the new Pumping Station to be built at Lard-

ner's Point, on the Delaware river, three (3) vertical triple expansion, crank and fly-wheel pumping engines, each capable of pumping twenty (20) million gallons per twenty-four (24) hours against a static head of two hundred and ten (210) feet above City datum, with steam pressure of one hundred and fifty (150) pounds at the engine throttle; three (3) batteries of marine type fire-box boilers, each battery consisting of four (4) boilers of two hundred (200) commercial horse power each, with steam at one hundred and sixty (160) pounds pressure, and one (1) thirty (30) ton electric traveling crane.

The contract requires that the pumping engines shall develop a duty of one hundred and thirty (130) million foot pounds per one hundred (100) pounds of coal on a twenty-four (24) or forty-eight (48) hour trial, and that, on a ninety (90) days continuous run, they shall develop a duty of one hundred and ten (110) million foot pounds per one hundred (100) pounds of coal.

The boilers shall admit of an economical evaporation of six thousand (6,000) pounds of water per hour from a feed water temperature of about one hundred (100) degrees Fahrenheit into steam at one hundred and sixty (160) pounds gauge pressure.

The electric traveling crane shall be capable of lifting safely sixty thousand (60,000) pounds. The span of the crane will be approximately ninety-eight (98) feet, and the free lift of the hook fifty-seven (57) feet.

The work is in satisfactory progress.

Date of receipt of bids, May 1st, 1901.

Award made to Holly Manufacturing Co., Lockport, N. Y., May 24th, 1901.

Contractor ordered to begin work, June 12th, 1901.

Time, for first engine, 12 months; time expires June 12th, 1902.

For second engine, 15 months; time expires Sept. 12th, 1902.

For third engine, 18 months; time expires Dec. 12th, 1902.

For crane, 10 months; time expires April 12th, 1902.

Limit of contract, three hundred sixty thousand ($360,000) dollars.

No payments made on account of contract.

Inspector, John Rowbotham.

Contract No. 12.

Upper Roxborough Filters.

The work under this contract consists of building a filter plant, located upon property appropriated by the City, situated immediately north of the intersection of Port Royal avenue and Hagy street, in the Twenty-first Ward, and adjacent to the Upper Roxborough Reservoir.

The water which will supply this plant will be taken from the Schuylkill river at Shawmont, and pumped to the Upper Roxborough Reservoir. This reservoir, which was finished in 1893, will be utilized as a sedimentation basin. It is divided into two (2) compartments, each twenty-five (25) feet deep, and has a total capacity of about one hundred and forty-seven (147) million gallons at an elevation at the water line of four hundred and fourteen (414) feet above City datum. Settled water will be drawn from this reservoir and supplied to the filters by centrifugal pumps which will be located in an extension to the present Roxborough Auxiliary Pumping Station.

The location and general arrangement of the plant is shown on one of the accompanying plans (2-A-61). The plant consists of eight (8) covered sand filters, a covered filtered water basin, and courts for storing and washing filter sand. The topography of the ground is such that the filters have all been arranged on one level, with the filtered water basin situated at a lower level.

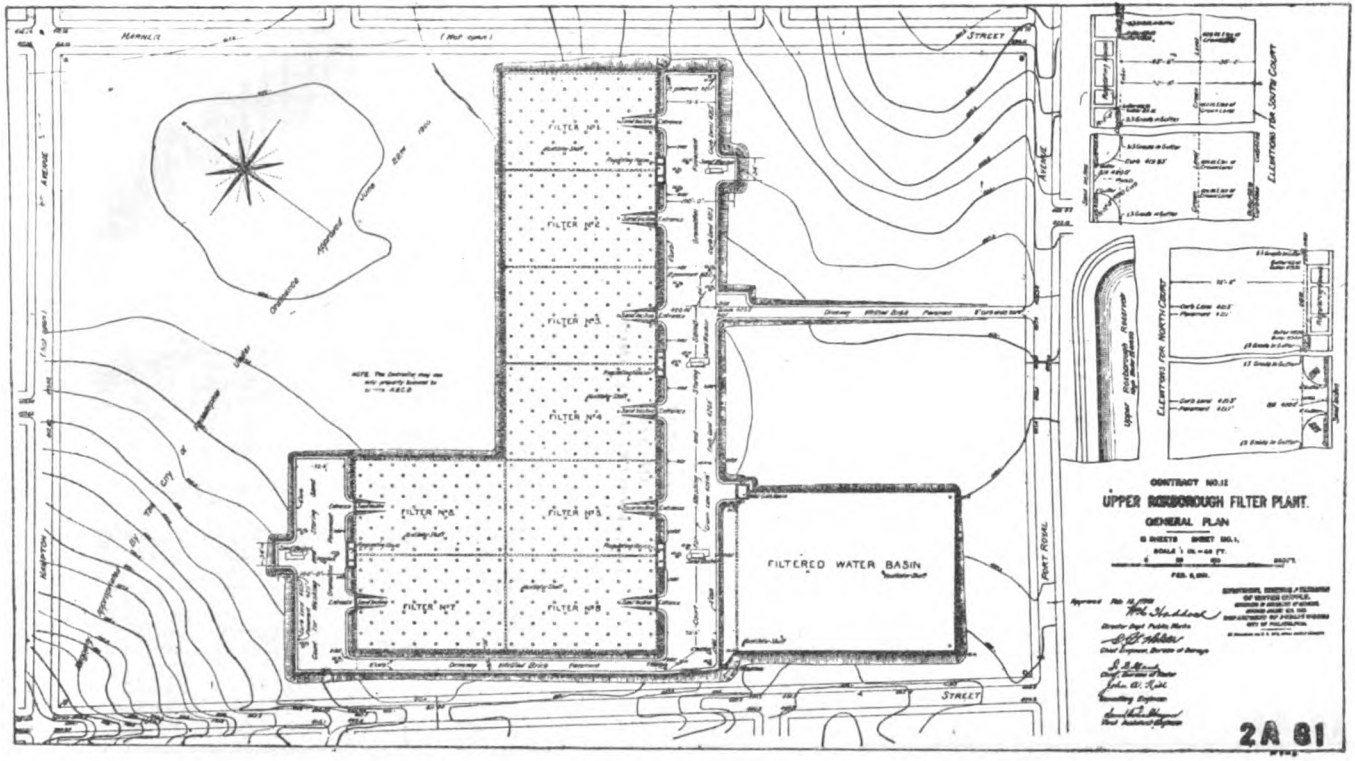
Each filter measures one hundred and forty (140) feet eight (8) inches by two hundred and nineteen (219) feet ten (10) inches on the neat lines, and has a net filtering area, at the normal sand line, of about thirty thousand three hundred and eighty (30,380) square feet or six hundred and ninety-eight-thousandths (0.698) acre. Assuming a nominal rate of filtration of three (3) million gallons per acre per twenty-four (24) hours, each filter will yield about two million one hundred thousand (2,100,000) gallons per twenty-four (24) hours, or with seven (7) filters in service the capacity of the plant will be about fourteen million seven hundred thousand (14,700,000) gallons per twenty-four (24) hours.

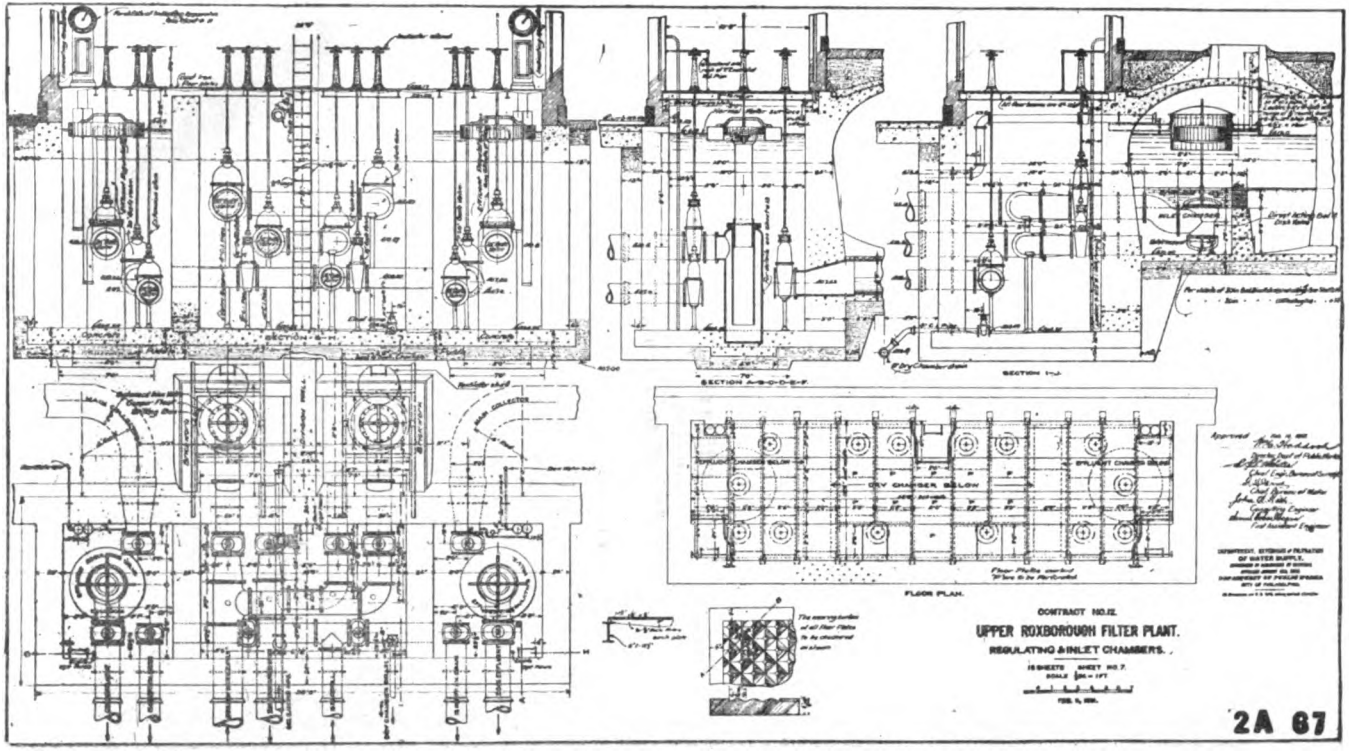
The filters will be of the same type of construction as those which are being built at the filter plant, adjacent to the Lower Roxborough Reservoir, and which are very fully described under Contract No. 10.

The furnishing and placing of the filtering materials is not included in the contract for the construction of the filters.

The regulating and inlet chambers for controlling the operation of the filters are shown on one of the plans. Each filter will have its own regulating chambers, but instead of being located at the center of one side of the filter, as was the case with the Lower Roxborough Filters, they will be located at the end of the dividing wall between each pair of filters. This arrangement possesses the advantage that the control of two filters will be brought into one house, thus tending to reduce the number of points for operating the plant.

The filtered water basin is similar in construction to that which is being built at the Lower Roxborough Filter Plant. It is a covered basin, rectangular in plan, measuring two hundred and thirty-seven (237) feet eight (8) inches by three hundred and eighteen (318) feet ten (10)





inches on the neat lines, is fifteen (15) feet deep, and has a capacity of about eight (8) million gallons at the water line, the equivalent of a little more than one-half day's supply.

Sufficient ground has been acquired by the City so that extensions may be made to the plant in the future as may be required.

Active work in the field by the Engineer Corps was begun May 1st, 1901, and has consisted in establishing and referencing all the base lines, and in giving lines and grades for all construction work.

The Contractor began work on May 15th, 1901, and has at the present time completed all the excavations for the filter-water basin, and practically all the trenches for the pipe lines and sewers. The terra cotta pipe is all laid and the manholes built, with the exception of a few short connections. All of the straight cast iron pipe has been delivered and about three-fourths of it laid. All of the puddle in the bottom of the filtered water basin has been laid and some of the lower courses placed on filters. The concrete floor of the filtered water basin is completed and seventy-two (72) of the piers built.

All of the large excavations were made by wheeled scrapers, or by wagons loaded by steam graders, of which the Contractor has two (2) on the ground.

In order to bring materials to the site of the work about two miles of electric railroad was built from Shawmont Station on the Schuylkill river, usel also in connection with the Lower Roxborough Filters, Contract No. 10. The Contractor uses nine (9) motor cars, two (2) trailers and eight (8) dump cars.

For preparing the puddle two (2) horizontal pug mills, each of a capacity of one hundred and fifty (150) tons per day, are in use. For rolling this puddle the plant consists of two (2) six (6) ton steam rollers, two (2) four (4) horse

cast iron grooved rollers, and one (1) two (2) horse cast iron grooved roller.

For the mixing of concrete two (2) cubical box mixers, each of two (2) cubic yards capacity, have been erected. The concrete is distributed by a Lidgerwood conveyor with two towers each eighty (80) feet high, and a span of eleven hundred (1,100) feet. The diameter of the main cable is two (2) inches, and the buckets have a capacity of one and one-half (1½) cubic yards each. The concrete is rammed by pneumatic rammers driven by an Ingersoll-Sargeant twelve (12) inch by fourteen (14) inch air compressor, with a capacity of seven (7) rammers. A sawmill has been erected to assist in the manufacture of the forms and centers for the concrete.

The average number of men employed per day since work was begun has been about 168. The maximum number on any one day was 260.

Date of receipt of bids, April 17th, 1901.

Award made to Daniel J. McNichol, Philadelphia, April 19th, 1901.

Contractor ordered to begin work, May 15th, 1901.

Time, nine (9) months.

Contract time expires, February 15th, 1902.

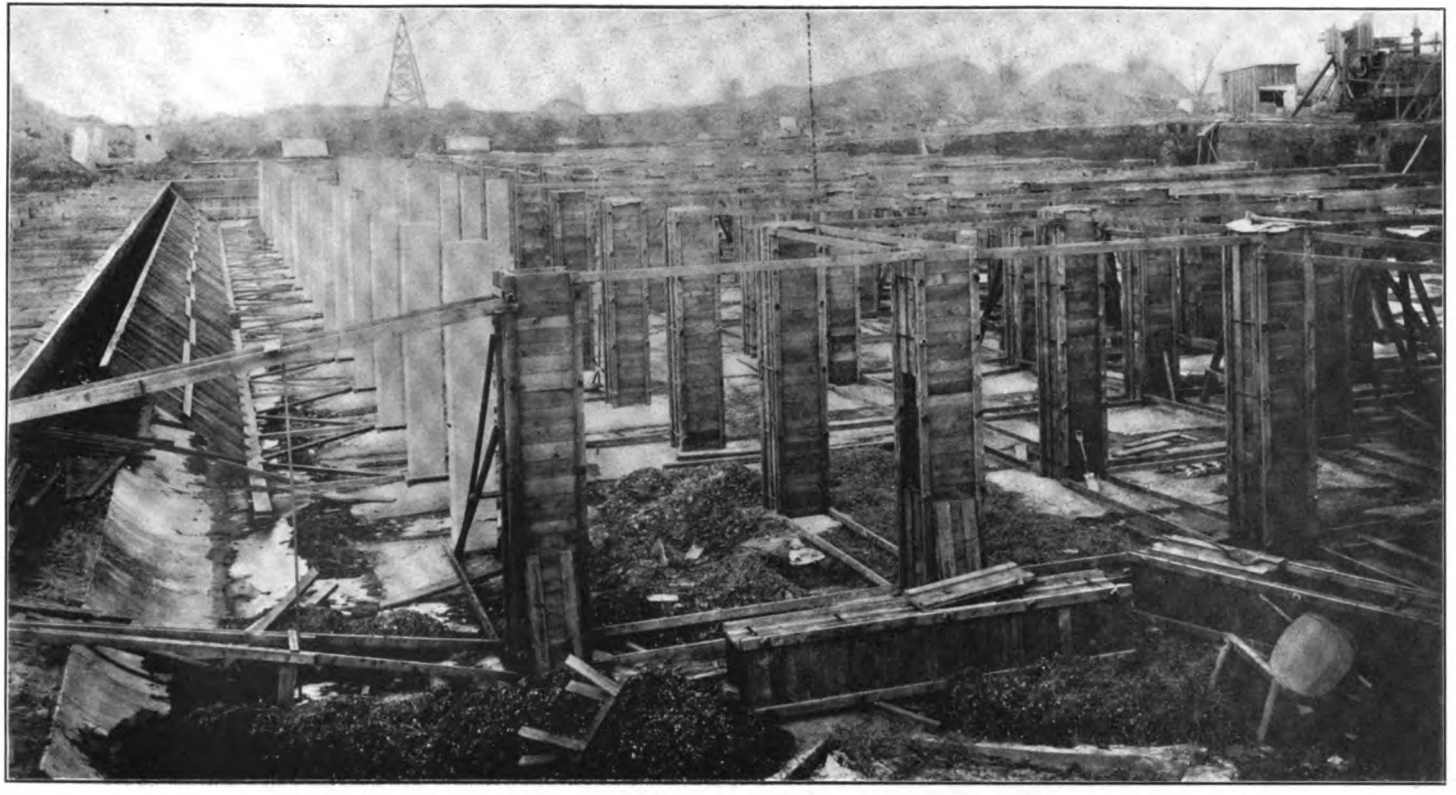
Contractor began work, May 15th, 1901.

Limit of contract, five hundred and forty thousand ($540,000) dollars.

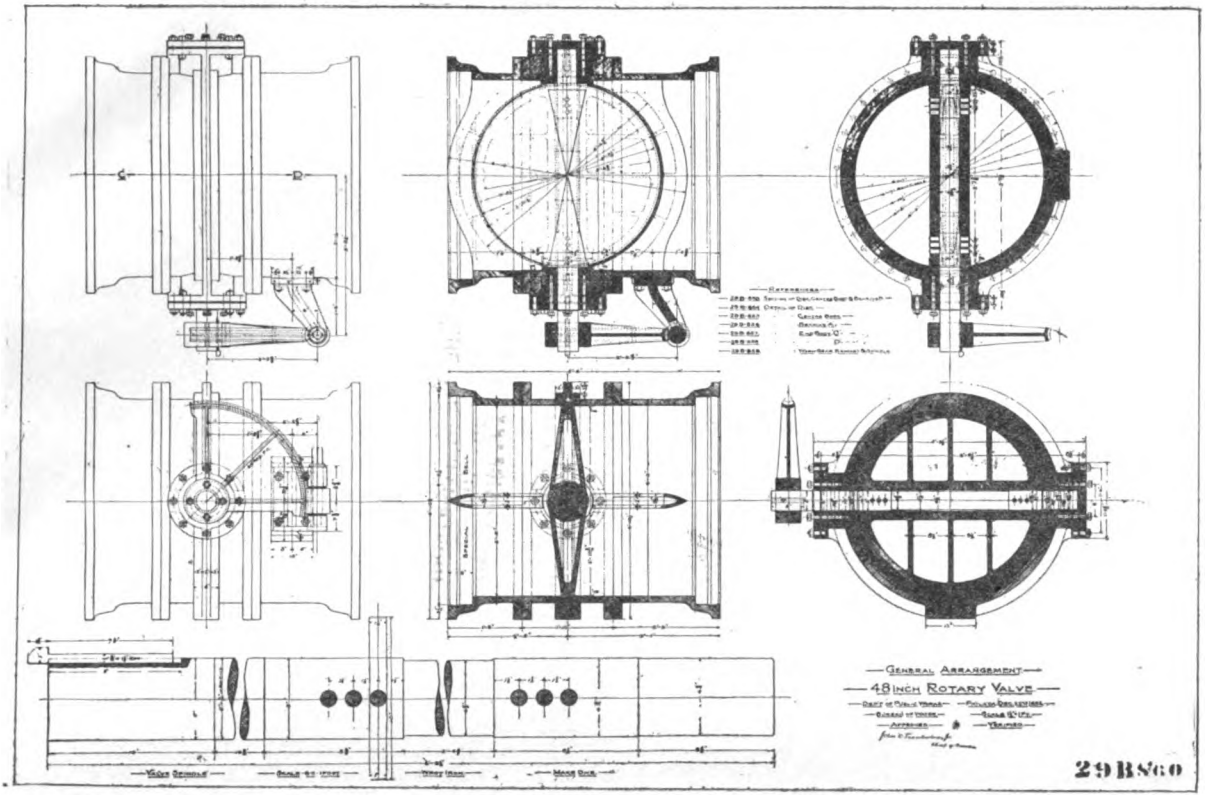
Total payment made Contractor, one hundred twenty-one thousand six hundred and eighty-four dollars and twenty-eight cents ($121,684.28).

Assistant Engineer in Charge, Stephen Harris. Second Assistant Engineer, Fred'k E. Field. Inspectors, William Connor and E. H. Middleton. Inspecting Engineers, R. W. Hunt & Co., for the cast iron pipe, valves, structural steel and other metal work.

EXCAVATION FOR FILTERS, UPPER ROXBOROUGH FILTERS. JANUARY 7, 1902.



FILTERED WATER BASIN, UPPER ROXBOROUGH FILTERS. JANUARY 7, 1902.



Contract No. 13.

ROTARY STOP VALVES.

The work under this contract consists of the manufacture and delivery of the following list of bell end gate and rotary stop valves, from drawings prepared by the Bureau of Water.

Seven (7) 48-inch Rotary Stop Valves.
One (1) 36-inch Rotary Stop Valve.
Five (5) 30-inch Rotary Stop Valves.
Four (4) 20-inch Rotary Stop Valves.

Also the manufacture and delivery of the patterns and core boxes for each of the above mentioned sized valves.

The work is well advanced under this contract and the larger valves have all been shipped.

Date of receipt of bids, April 17th, 1901.

Award made to Eddy Valve Company, Waterford, N. Y., April 18th, 1901.

Contractor ordered to begin work, June 20th 1901.

Time, eight (8) months.

Contract time expires, February 20th, 1902.

Limit of contract, thirteen thousand ($13,000) dollars.

No payments have been made to the Contractor.

Inspecting Engineers, R. W. Hunt & Co.

Contract No. 14.

TORRESDALE CONDUIT.

The work under this contract consists of building a conduit for conveying filtered water from the Torresdale Filter Plant on the Delaware river to the Pumping Stations at Lardner's Point, in the Forty-first Ward.

The conduit, which will be built entirely in tunnel, will connect by shafts at the upper end with the filtered water basin of the filter plant, and at the lower end with the pump wells in the Pumping Station. The filtered water

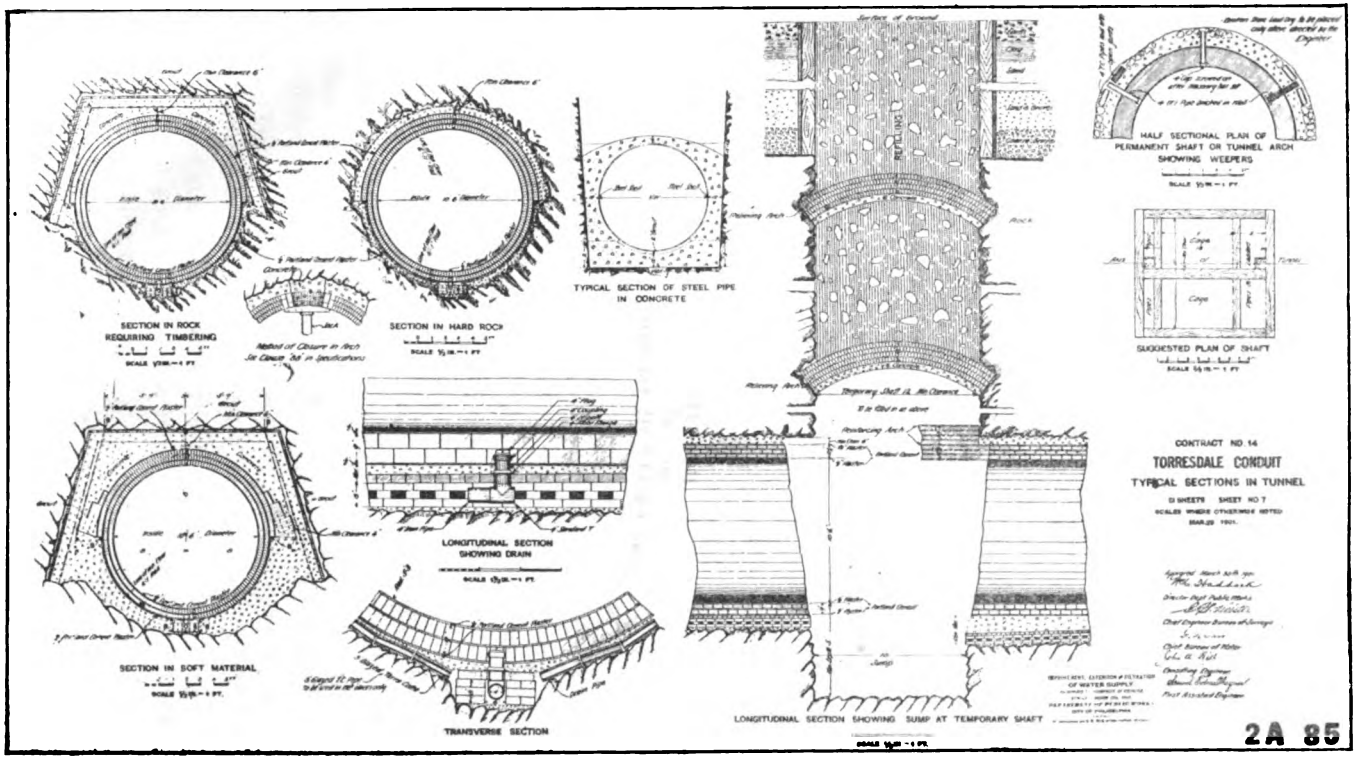
will be delivered from this Station direct into the distribution mains of the City. It is expected that the tunnel will be driven entirely through rock, and diamond drill borings made along the route indicate the probable nature of the material to be mica schist, mica, hornblende and biotite gneiss of varying degrees of hardness.

The conduit, which will have a capacity of 300,000,000 gallons per twenty-four (24) hours, will be circular in section, ten (10) feet six (6) inches internal diameter, after being plastered, thirteen thousand eight hundred and fifteen (13,815) feet in length, center to center of end shafts. The bottom of the conduit at the Torresdale end of the work will be ninety-eight and sixty-eight hundredths (98.68) feet below mean high water, or about one hundred and fifteen (115) feet below the surface of the ground, and at the Lardner's Point end of the tunnel it will be eighty-eight and fourteen hundredths (88.14) feet below mean high water, or about ninety-three (93) feet below the surface of the ground. It will be laid with a uniform grade of nine (9) inches in one thousand (1,000) feet upward from the Torresdale end. Work will be carried on simultaneously from eleven (11) shafts, of which two (2) will be permanent or end shafts, and nine (9), working shafts. Headings will be driven in both directions from all working shafts, and in one direction from each of the permanent end shafts.

The permanent end shafts will be sunk through strata of sand, clay, water-bearing gravel and rock. The parts of the permanent shafts through the drift and soft rock formation above the hard rock will be curbed with riveted water-tight steel shells. The shells will extend a sufficient distance into the rock at their lower ends to allow a water-tight joint being made between the shells and the surface of the rock excavation behind them.

The riveted steel shells forming the upper part of Shaft

SHELL FOR WORKING SHAFT, TORRESDALE CONDUIT. NOVEMBER 30, 1901.


SECTION IN ROCK REQUIRING TIMBERING
SECTION IN HARD ROCK
TYPICAL SECTION OF STEEL PIPE IN CONCRETE
HALF SECTIONAL PLAN OF PERMANENT SHAFT OR TUNNEL ARCH SHOWING WEEPERS
SUGGESTED PLAN OF SHAFT
SECTION IN SOFT MATERIAL
LONGITUDINAL SECTION SHOWING DRAIN
TRANSVERSE SECTION
LONGITUDINAL SECTION SHOWING SUMP AT TEMPORARY SHAFT
CONTRACT NO. 14
TORRESDALE CONDUIT
TYPICAL SECTIONS IN TUNNEL
2A 85

No. 1 will be fourteen (14) feet outside diameter, and will be formed of three-quarter (¾) inch steel plates below mean high water; above this elevation the plates will be five-sixteenths (5/16) inch thick. The shells forming the upper part of shaft No. 11 will be twenty-four (24) feet six (6) inches in outside diameter, and will be made of three-quarter (¾) inch steel plates for its entire length. The shells will be made in lengths approximately six (6) feet long. The circular seams will be made with 4″ x 4″ x ¾″ bent steel angles riveted to the plates. The sections will be bolted together with one and one-quarter (1¼) inch bolts, and each joint will be made water-tight by a rubber gasket three-sixteenths (3/16) inch thick and five (5) inches in width. The longitudinal seams will be butt-joint with inside cover plates. All rivets will be seven-eighths (⅞) inch in diameter and countersunk on the outside. At the bottom of the shells, on the inside, will be riveted a cast iron shoe for the support of the brick lining during the sinking, and a reinforcing plate on the outside three-quarters (¾) inch thick.

After the steel shells have been sunk to their permanent positions, and the seal made at the bottom of the cylinders, two (2) circular openings will be cut in the shells. At shaft No. 1 the openings will be seven (7) and eight (8) feet inside diameter, and at Shaft No. 11 they will be seven (7) and twelve (12) feet six (6) inches inside diameter. On the inside of the openings will be bolted cast iron masonry protecting collars. On the outside of each of these openings will be bolted a cast iron nozzle to which will be connected twenty-eight (28) feet of riveted steel pipe laid in concrete. The riveted steel pipes at Shaft No. 1 will connect with the outlet pipes from the filtered water basin at the Torresdale Plant, and at Shaft No. 11 the pipes will connect with the pump wells at the Lardner's Point Pumping Station.

Shaft No. 1 will have a finished inside diameter of ten (10) feet six (6) inches for its entire length. Shaft No. 11 will have a finished inside diameter of twenty-one (21) feet from the top of the shaft down to elevation 176, from which point it will decrease in size down to elevation 164.5, where it will be ten (10) feet six (6) inches inside diameter; below this point, and connecting with the tunnel, it will remain ten (10) feet six (6) inches in diameter. Each of these shafts will be lined with brickwork eighteen (18) inches in thickness, laid in Portland cement mortar, and plastered on the inside with a one-half ($\frac{1}{2}$) inch thickness of Portland cement mortar mixed in the proportion of one (1) part, by volume, of cement to two (2) parts of sand. Behind the brickwork and inside the steel shell the entire space will be filled with fine Portland cement concrete.

The permanent shafts will be carried up to elevation 216.46 and will be finished with a floor composed of steel "I" beams and brick arches with a granolithic finish. Into each floor will be built manholes and an opening for a float guage.

The conduit will be ten (10) feet six (6) inches inside diameter, after being plastered, for its entire length. The invert of the conduit will be lined with two (2) rings, and the arch with three (3) concentric rings of brick laid in Portland cement mortar mixed in the proportion of one (1) part of cement to three (3) parts of sand. Previous to laying the brickwork in the invert a cradle will be formed of Portland cement concrete, mixed 1: 3: 5, plastered with Portland cement mortar and allowed to set firmly. The entire space between the arch masonry and the surface of the excavation will be filled with Portland cement concrete mixed 1: 3: 5. The entire inside surface of the conduit will be plastered with Portland cement mortar one-half ($\frac{1}{2}$) inch in thickness mixed in the proportion of one (1) part of cement to one and one-half ($1\frac{1}{2}$) parts of sand.

Active work in the field by the Engineer Corps began September 23, 1901, and has consisted in establishing and referencing the tunnel alignment accurately on the surface, locating the shafts and establishing precise bench marks. Twenty-two (22) working field drawings have been made by this Corps.

The work accomplished by the Contractor has been largely of a preliminary nature, consisting of erecting compressor plants, laying air pipes and mains, and getting steel working shafts in position for sinking. The Contractor decided to use a steel cylinder twelve (12) feet in diameter, with a cast iron cutting shoe, for his working shafts, similar to those required for the permanent shafts, so that in case compressed air is necessary air locks may be used. At each working shaft a derrick with the necessary hoisting apparatus and engine house has been erected.

For purposes of hastening the progress of the work the Contractor has divided it into four (4) sections and established an Air Compressor Plant for each section.

Section 1, consists of Shafts 1, 2, 3 and 4 with the Compressor Plant established at Shaft No. 3 on the House of Correction grounds. At this point a boiler and compressor house, coal shed, blacksmith shop and water supply tank has been erected. The plant on this section also includes cement-house, storehouse, commissary and shanties for foreman and laborers.

Shaft No. 1 has not been started.

Shaft No. 2, the steel casing has been sunk to a depth of twenty-three (23) feet.

Shaft No. 3, the steel casing has been sunk to a depth of thirty-five and five-tenths (35.5) feet.

Shaft No. 4, the steel casing has been sunk to a depth of thirty-one (31) feet.

Section 2, Consists of Shafts No. 5 and 6, with compressor plant established at Shaft No. 6 at the corner of Eugene

and Bleigh streets. At this point the plant consists of a boiler and compressor house, office, cement-house, shop, store-house and quarters for men.

Shaft No. 5 has been excavated to a depth of twenty-seven and three-tenths (27.3) feet.

Shaft No. 6 has been excavated to a depth of thirty-five and eight-tenths (35.8) feet.

Section 3, Consists of Shafts No. 7 and 8, with plant located at Shaft No. 8 in the yard of the Pennsylvania Railroad Company at Tacony, at the foot of Disston street. At this point the plant consists of a boiler and compressor house, office, blacksmith shop, cement-house and quarters for men. The plant at Shaft No. 7 consists of office, engine house, store house, cement house, derrick, hoisting engine and house for workmen's clothing.

Shaft No. 7 has been excavated to a depth of 14.0 feet.

Shaft No. 8 has been excavated to a depth of 43.0 feet. An orange peel excavator is being used at Shaft No. 8.

Section 4, Consists of the work at Shafts No. 9, 10 and 11, with compressor plant located at the corner of Levick street and Delaware avenue. At this point the plant consists of a boiler and compressor house, office, blacksmith shop, quarters for men, commissary and store house. The plant at Shaft No. 9 consists of hoisting engine, engine house and derrick.

Sections.	Shafts.	Location of Compressor Plant.	Boilers.				Compressors.						
			Type.	Number of	Horse Power each Boiler.	Make.	Number of	Make.	Type.	Air Cylinder in Inches.	Steam Cylinder in Inches.	Stroke in Inches.	Capacity, Free Air per Minute.
1	1, 2, 3, 4	Shaft No. 3, House of Correction grounds..	Locomotive.	2	100	Erie, Pa...	2	Rand.....	Straight line	24	24	30	2,670 At 85 rev.
2	5, 6	Eugene & Bleigh sts....	Locomotive.	2	100	Erie, Pa...	*1	Ingersoll Seargent.	Straight line	22¼	22	24	960 At 94 rev.
3	7, 8	Penna. R. R. yard, foot of Disston street.....	Return Tubular.	2	100	Erie, Pa...	1	Sullivan.....	Compound	H. P 22 L. P. 14	H. P. 22 L. P. 14	24	1,160
4	9, 10, 11	Delaware avenue and Levick street.....	Locomotive.	2	100	Erie, Pa...	1	Rand.....	Duplex.....	20	20	30	1,900 At 87 rev.

Shaft No. 9 has been excavated to a depth of 25.5 feet.

Shaft No. 10 has been excavated to a depth of 41.0 feet.

Shaft No. 11 has not been started.

Date of receipt of bids, May 28, 1901.

Award made to Daniel J. McNichol, Philadelphia, August 28, 1901.

The Contractor has not been ordered to begin work.

Time, nine (9) months.

Contractor began work, December 5, 1901.

Limit of contract, one million three hundred fifty thousand ($1,350,000) dollars.

No payments have been made to the Contractor.

Assistant Engineer in Charge, R. I. D. Ashbridge.

Second Assistant Engineer, T. N. Spencer.

Mining Inspector, A. York Smith.

Inspecting Engineers for steel and cast iron work, R. W. Hunt & Co.

Contract No. 15.

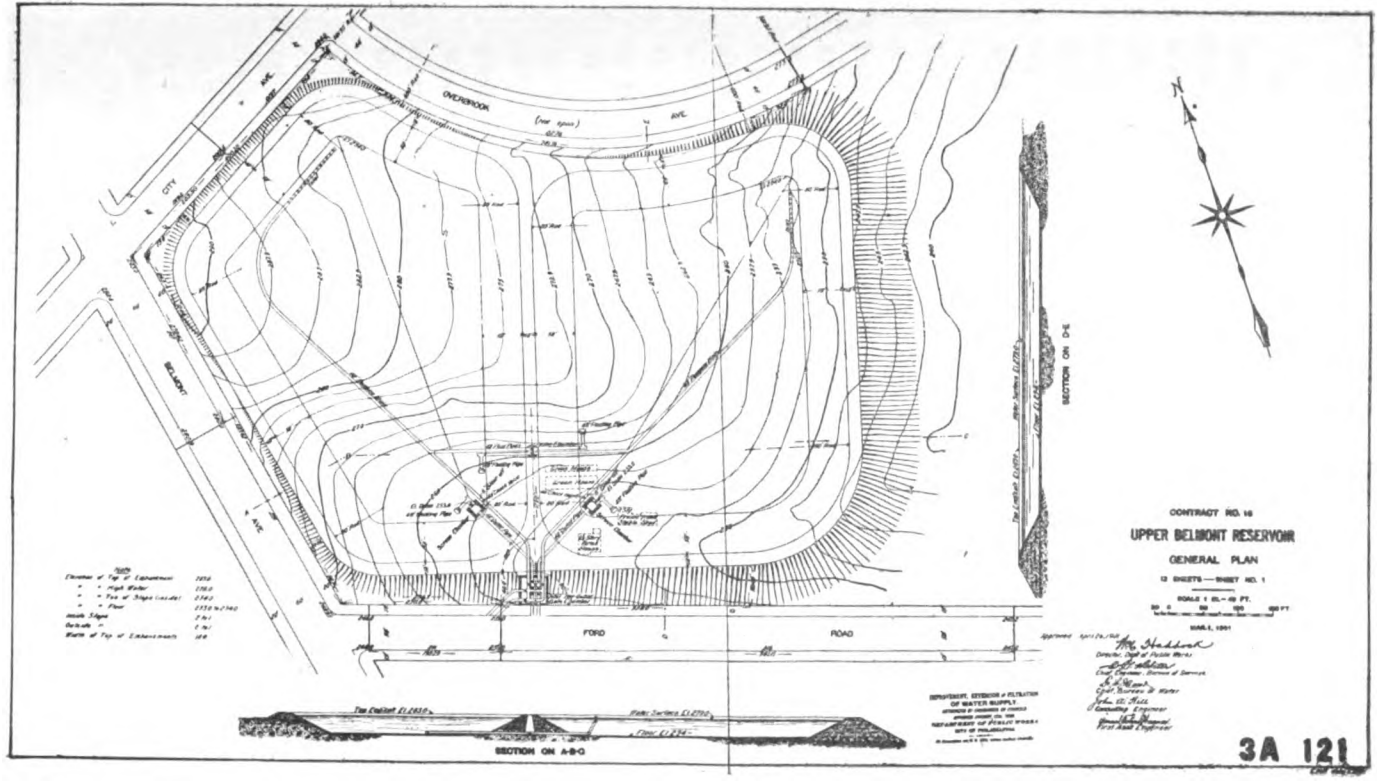
TEST PITS, LARDNER'S POINT.

The work under this contract consisted in digging a test pit adjacent to the Frankford Pumping Station at Lardner's Point in order to determine the character of the material on the site of the Pumping Station. The work was not advertised for and was executed by the employees of the Bureau of Water.

Contract No. 16.

BELMONT FILTERS.

The work under this contract consists of building a settling reservoir and filter plant, located upon the property appropriated by the City, situated immediately North and South of Ford Road and between Belmont avenue and Monument avenue, in the Twenty-fourth Ward.



A general plan of the reservoir is shown on one of the accompanying plans. It will be divided by an embankment into two (2) compartments having a total capacity of 73,000,000 gallons at the water line, which will be at an elevation of 279 feet above City Datum, and the reservoir will be 25 feet deep. Water will be pumped to the reservoir from the Schuylkill river from the present Belmont Pumping Station, an extensive addition to which has just been completed.

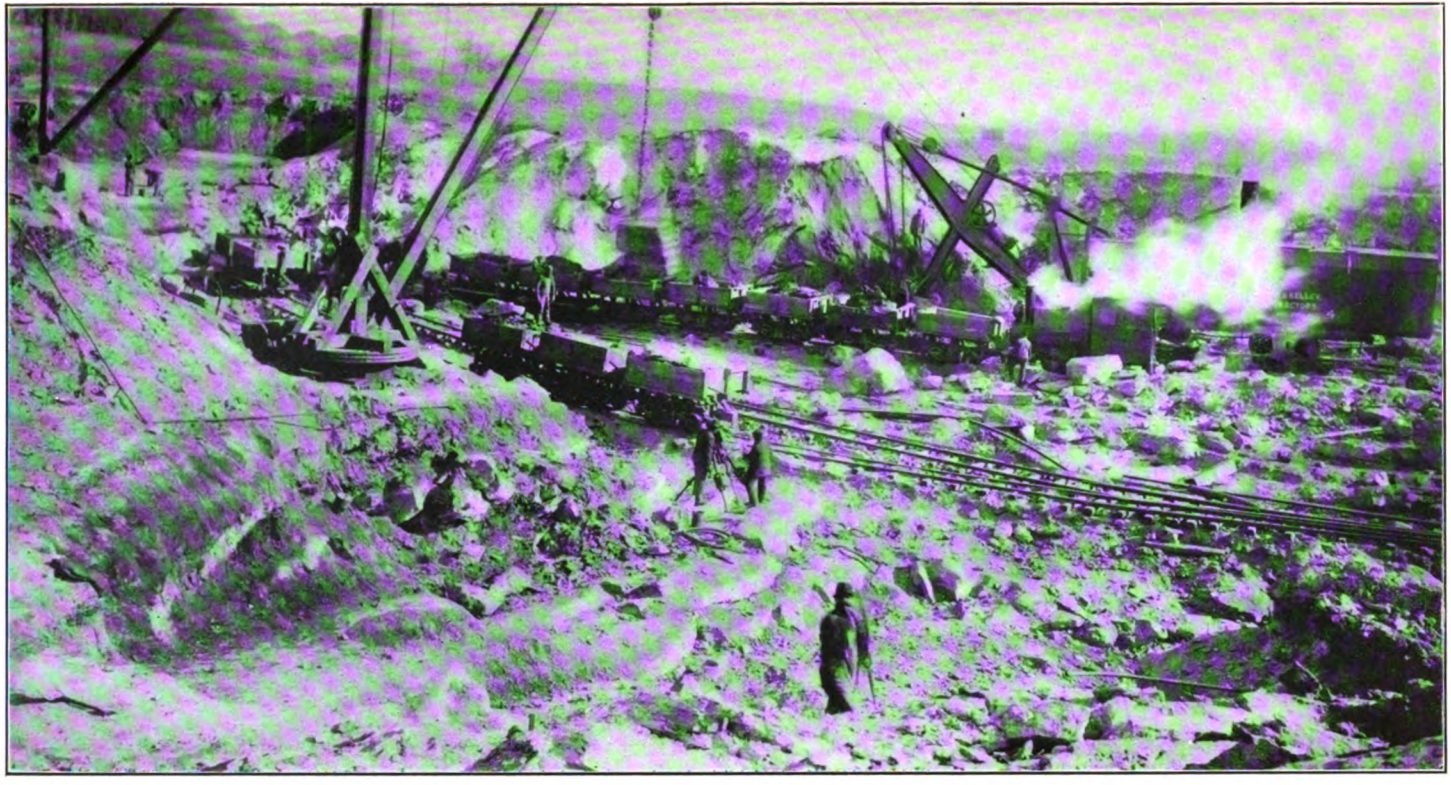
The reservoir is located in a side hill, mainly in excavation. Typical sections of the embankments and linings are shown on one of the accompanying drawings. The embankments will be 18 feet in width at the top, and will have side slopes of 1 on 2. Over the whole floor of the reservoir will first be placed a layer of clay puddle 18 inches in thickness consisting of prepared clay and gravel. This lining will be carried up on the slopes of the embankments to a point above the water line of the reservoir, retaining the full thickness of 18 inches at all points. On top of the puddle on the floor of the reservoirs will be placed a layer of concrete 5 inches in thickness. On the embankments at the top of the slope the concrete will have a thickness of 7 inches, and will gradually decrease to a thickness of 6 inches at the point where the slope paving begins. From here up it will again decrease until it reaches a thickness of 5 inches at the top of the bank. On top of the concrete over the whole floor, and extending up the slopes of the embankments to a point 9 feet 6 inches vertically below the water line, a layer of asphalt $\frac{3}{4}$ inch in thickness will be placed. The concrete under the Neufchatel asphalt will be indented with grooves $\frac{1}{2}$ inch deep, $\frac{3}{8}$ inch wide and 4 inches apart. On the slopes where the asphalt is not used the upper surface will be finished with a 1 inch granolithic surface.

The upper part of the inner slopes of the embankments

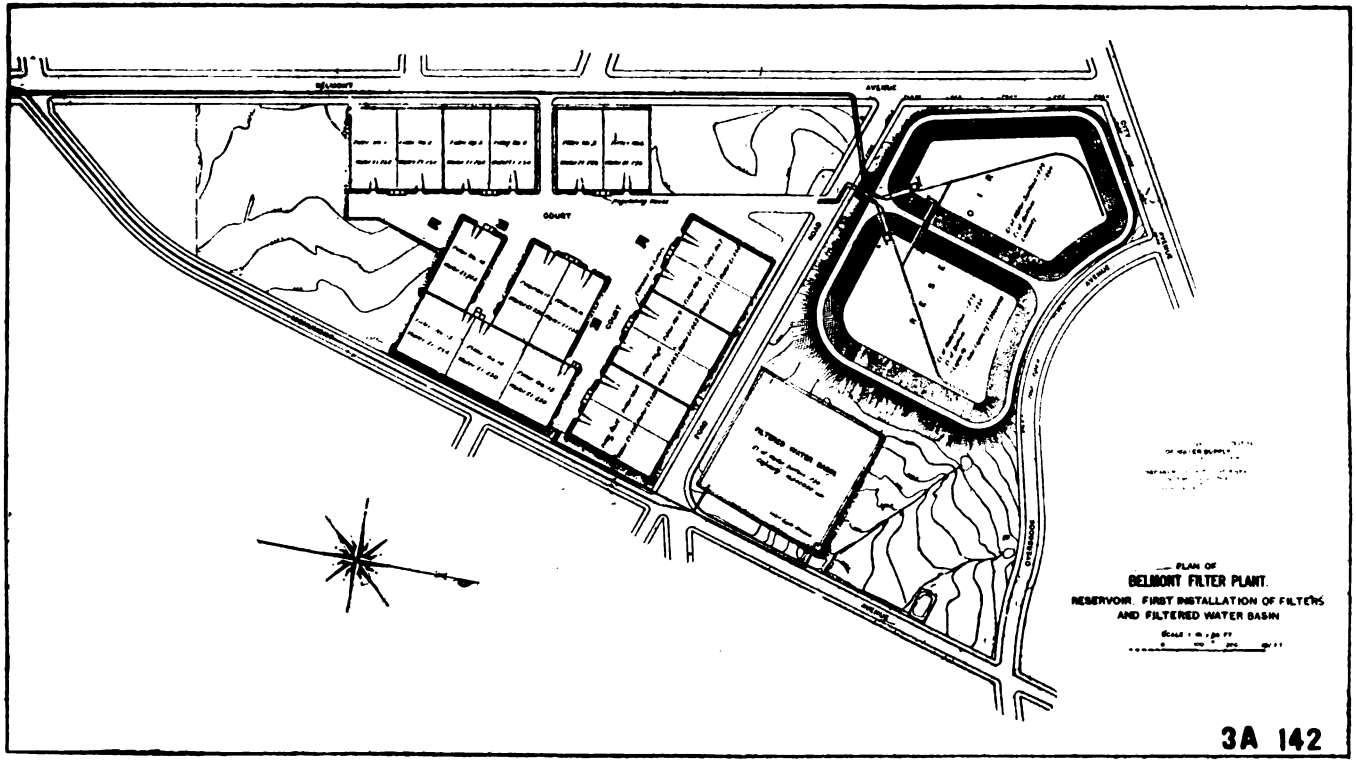
will be paved with paving blocks laid on 19 inches of broken stone. These blocks will be of granite, rectangular in shape, 8 to 14 inches long, 3½ to 5 inches wide and 7 inches deep. On the inside edge of the driveways around each of the compartments will be placed a substantial concrete curb.

At the end of the division embankment, on the outer side, will be built a gate chamber through which the inlet and outlet pipes will pass. The valves for controlling the admission to and discharge from the reservoir will be located in this chamber, details of which are shown on one of the plans. Each compartment of the reservoir will have an inlet and outlet pipe, and these are also connected together in the chamber that water can be pumped into either compartment, or either pump main can supply either outlet pipe directly. From the gate chamber the inlet and outlet pipes will pass through the embankments to the reservoir and to the screen chamber.

As the reservoir is to be used primarily as a settling basin it will be of interest to note how the water is to be admitted to and drawn off from the reservoir. Referring to the general plan of the reservoir, and starting at the gate chamber, the water will be forced through the pumping main laid on the floor of the easterly compartment to the extreme end; here it will be admitted through special branches at the bottom of the reservoir and will receive its first period of sedimentation in this compartment. The water will pass diagonally across the basin to a so-called floating discharge pipe near the end of the dividing embankment. This discharge pipe will consist of a 48-inch riveted iron pipe ⅜ inch thick, placed at an inclined position to the bottom of the reservoir. At the bottom of the pipe a hinge joint will be provided, and the top of the pipe will be carried by a cylindrical iron float. The float will keep the mouth of the pipe at a constant distance of a few feet below



EXCAVATION FOR RESERVOIR, BELMONT FILTERS. JANUARY 4, 1902.



the surface of the water so that the upper portion of the water only in the basin can be drawn off, and by means of the hinged joint at the bottom the pipe will rise and fall as the water fluctuates in the basin.

Entering this floating discharge pipe in the easterly compartment of the reservoir the water will pass down and through the equalizing pipe in the division embankment into the westerly compartment and to the extreme northerly end where it will issue in this compartment at the bottom; then passing diagonally across and upwards through this basin it will be drawn off at the top through another floating pipe connected with the screen chamber, thus completing a full transit through both compartments of the reservoir. From the second floating pipe the water will pass through the screens in the screen chamber and thence through the outlet pipe and gate chamber to the filters which will be located across Ford road from the Sedimentation Reservoirs. By changing the stop valves the water can be admitted to the easterly compartment first and then drawn off from the easterly one. If so desired the water can be drawn off from the same compartment into which it is supplied, or both compartments can be used independently at the same time.

To the south of Ford road is located the Filter Plant. The general arrangement of the filters in plan is irregular and is shown on an accompanying drawing. It consists of eighteen (18) covered sand filters, a court for storing and washing filter sand, and driveway approaches from Belmont avenue and Ford road. Owing to the topography of the ground it was found necessary to arrange the filters in a series of steps conforming as closely as possible to the contours, the greatest difference in level between any two adjacent filters being three feet. At a low point of ground several of the filters will be built on a fill.

The filters, 18 in number, are all rectangular in shape, eight filters measuring 120 feet 2 inches by 272 feet 8 inches on the neat lines. Seven filters measuring 135 feet 5 inches by 242 feet 2 inches, and the other three filters measuring 165 feet 11 inches by 196 feet 5 inches. Each filter has, approximately, 32,000 square feet or 0.735 acre net filtering area at the normal sand line. Assuming a normal rate of filtration of 3,000,000 gallons per acre per 24 hours, each filter will yield approximately 2,200,000 gallons daily. With fifteen filters in service the capacity of the plant will be, approximately, 33,300,000 gallons daily. A reserve area of three filters, or 20 per cent. of the net area in service, has been provided. The capacity of this plant, as recommended by the Board of Experts in their report in 1899, was 27,000,000 gallons daily, but, owing to an increase in consumption since that time, and to other considerations, it was deemed advisable to provide for 33,000,000 gallons daily in the present installation. Sufficient land has been acquired by the City to extend the plant ultimately to a capacity of 55,000,000 gallons daily.

In general the construction of the filters will be similar to that adopted for Contracts No. 10 and 12. The floors, piers, walls, vaulting and puddle lining being essentially the same. In such portions of the floors as are built on a fill, expended metal, 3 inch mesh No. 10, will be imbedded.

The filtered water basin is rectangular in plan measuring 382 feet 2 inches by 396 feet on the neat lines, and will have an available depth of 15 feet for storing filtered water. It will have a capacity of 16,500,000 gallons at the normal water line, which is equivalent to a little over one-half day's supply. In general construction the basin will be similar to the filters except that the piers will be 22 inches square for their entire heighth, and the semi-elliptical groined arches of the vaulting will have a span

of 14 feet. Filtered water will be admitted through an inlet chamber in one corner in which will be placed a 48-inch balanced valve with a float and walking beam for controlling the level of the water. Provision has been made in designing the chamber for the addition of another compartment to the basin in the ultimate extension of the works. Water will be drawn off in another corner from the bottom of the basin direct into the distribution mains. Two 30-inch overflow pipes have been provided.

The pipes and sewers have been designed of sufficient capacity to provide for the future filters. Advantage has been taken of the fact that filters have been located on different levels to so arrange the pipes that raw water, and also the last filtered water just before scraping, obtained by allowing the water level in the filter to drop a few inches below the top of the sand, may drain and supply the lowest filters for a few hours.

As far as possible the regulating chambers of two adjacent filters have been brought into one house located at the end of the dividing walls between the filters, but where the location and elevation was such that this could not be accomplished, single chambers have been provided. Each filter has its own effluent chamber in which will be located the floating weir for controlling the rate of filtration. Between the two effluent chambers will be a dry chamber which will contain the raw water supply pipes, raw water drain and refilling pipes. The drain from the effluent chamber will be carried into the dry chamber and connect them with the raw water drain pipe, and in each will be placed a check valve to prevent backing up of raw water into the effluent chamber. In each effluent chamber will be placed an indicating apparatus to show the loss of head on the filters, and also the elevation of water in the filter.

The regulating houses will be built of brick masonry,

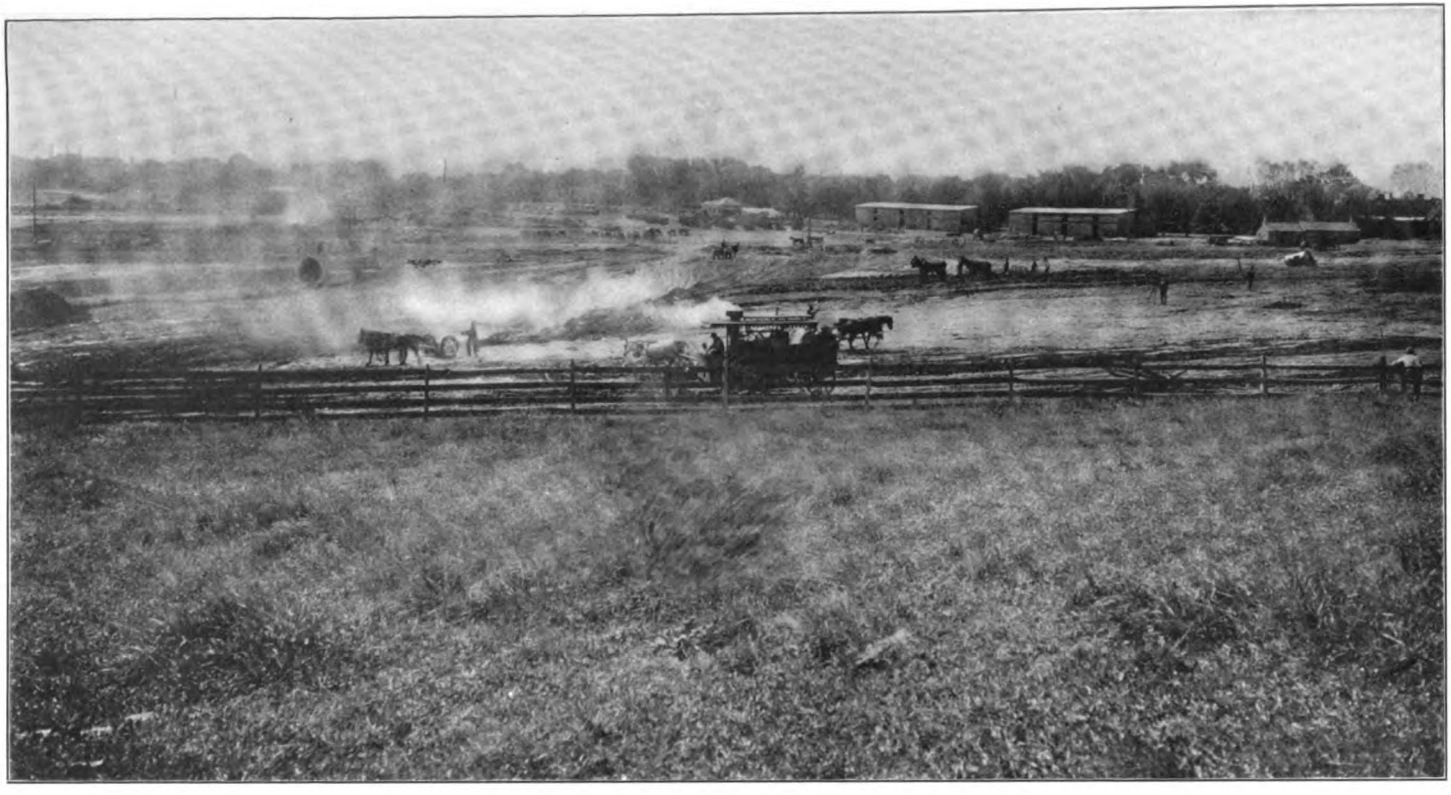
faced with Roman pressed brick with terra cotta and granite trimmings, and lined with red stretcher brick.

In each filter will be built a sand incline and run for the removal of scraped sand and replacing of washed sand.

The courts will be paved with granolithic pavement, consisting of 4½ inches of Portland cement concrete with a 1½ inch granolithic wearing surface laid on 14 inches of cinders.

Work on the reservoir was not begun until August 1st, 1901, owing to legal difficulties in obtaining possession of the land. The top soil was removed and stored on private property secured by the Contractors. Early in September the work of excavating the basins and constructing the embankments was begun. Wheeled scrapers were used on this work, the layers of earth being leveled with a road machine drawn either by mules or a traction engine.

Surplus material of a suitable quality was brought from the filter site and used in the embankments. After the layers were leveled they were rolled by a steam roller wighing not less than ten (10) tons, and not more than one (1) foot of roller for three thousand (3,000) pounds of weight. Considerable progress had been made with the embankment when, on December 18th, work was practically suspended on account of the weather. The excavation is now about one-half (½) completed. The Contractors have in use on the reservoir two (2) sixty-five (65) ton shovels with 2¼ cubic yard dippers; five (5) ten (10) ton locomtives; fifty (50) three (3) yard dump cars; ten (10) steam drills, and one (1) well digging machine. Also four (4) 25 and (1) 18 H. P. traction engines. Two (2) "New Era" excavators were used to load top soil on dump wagons. These machines were drawn by traction engines, and when working under fair conditions are capable of loading in one minute a wagon holding one and one-half (1½) cubic yards.



BELMONT FILTER PLANT. OCTOBER 4, 1901.

The number of men employed on the reservoir has varied greatly, but has averaged one hundred and fifty (150), not including teams and drivers.

Work was begun on the filters on July 10th in clearing the ground. On July 12th work was started on the sewers working backward from the outlet sewer on Belmont avenue, and the whole drainage system, excepting the connections to the regulating houses, was completed on November 21st, 1901. There are sixteen hundred and eighty-three (1,683) lineal feet of thirty-six (36) inch brick sewer and twenty-two hundred and seventy-one (2,271) lineal feet of terra cotta pipe varying from thirty (30) inches to twenty (20) inches in diameter laid in concrete. After the top soil was removed the first excavated material was deposited on the low area under the filters on Monument avenue, and this fill with its retaining wall has been completed, except the coping on the latter. Late in November some puddle was placed on the floor of Filter No. 1, but this part of the work was soon suspended on account of the weather. On November 11th work was begun on laying cast iron water mains and has continued since. Two (2) forty-five (45) ton steam shovels were used in the excavations of the filters. These shovels loaded into wagons of one and one-half (1½) cubic yards capacity. Sixty-two (62) of these wagons were used.

The pug mills for mixing clay puddle consist of two (2) horizontal Chambers paddle continuous mixers, each driven by a 25 H. P. engine geared to the main shaft. The gravel and clay is mixed before it is elevated to the bin above the mixers, being carried by buckets on a link belt. The average number of men employed has been three hundred and fifty (350).

The only work performed on the filtered water basin has been the removal of the top soil and about one-fifth (1/5) of the excavation. The machinery used consisted

of the graders, wheel scrapers and one (1) three (3) ton steam shovel.

The Engineer Corps has been steadily engaged since July in giving the necessary lines and grades, and during this time, in addition to their field work, have prepared one hundred and forty-six (146) working drawings.

Date of receipt of bids, May 28th, 1901.

Award made to Ryan & Kelley, Philadelphia, June 26th, 1901.

Contractor was ordered to begin work August 22d, 1901.

Time, eighteen (18) months.

Contract time expires February 22d, 1903.

Contractor began work July 10th, 1901.

Limit of contract, two million ($2,000,000) dollars.

Total payments made to Contractor, three hundred forty-four thousand, one hundred fifty six dollars and fifty-six cents ($344,156.56).

La Monte Lloyd, Assistant Engineer in Charge. Thos. McE. Vickers and Charles H. Paul, Second Assistant Engineers. Inspectors, J. E. Kester, W. H. Wallen and John Reid. R. W. Hunt & Company are Inspecting Engineers for the cast iron pipe and all steel and structural work.

Contract No. 17.

Extension of Pipe System, Roxborough and East Park Districts.

The work under this contract consists in furnishing, delivering and laying the cast iron water pipe on Pipe Lines "A" to "J" inclusive, the routes of which were described under Contract No. 9, as well as the pipe around the Roxborough Reservoir, and for the crossings of Frankford Creek at Frankford avenue and Old Front street. The valves, stop box frames and covers are furnished under

DOUBLE LINE 30" PIPE, SILVERWOOD STREET. NOVEMBER 8, 1901.

Contracts No. 9-A and 9-B, but placed in position by the Contractor for Contract No. 17.

The work under this contract has been very much delayed on account of the delivery of the pipe, and especially of the special castings.

The pipe on Lines "A" and "B" have been laid by means of tripods with chainblocks or windlass. Of the two the windlass has proved to be much the quicker.

Pipe Line "J," on Broad street, consisting of a forty-eight (48) inch main from Arch street to York street, was laid by means of a steam traveling crane running on temporary tracks constructed on one side of the trench. This machine has a capacity of seven (7) tons at a radius of sixteen (16) feet, the weight of the machine being thirty-five (35) tons. It gave great satisfaction. The largest number of pieces of pipe laid in one day being fifty-two (52). A steam calking machine was used for a short time, but not long enough to demonstrate its usefulness.

All lines of pipe are required by the contract to be tested before the trench is refilled. The hydrostatic pressure has been obtained from a twelve (12) H. P. portable boiler and a Barr Pumping Engine with a three (3) inch suction and two (2) inch discharge, capable of pumping against a pressure of two hundred and fifty (250) pounds per square inch. The whole outfit was mounted on wheels which allowed it to be easily and rapidly transported from place to place. By means of this machine it is possible to obtain the desired pressure on any line in a few minutes after the connections have been made. The advisability of testing the pipe lines has been well demonstrated on this contract.

At the present time practically all the pipe has been delivered on the ground, but a considerable number of specials are still lacking.

Ground was broken on lines as follows:

Line "A," July 22, 1901.

Line "B," July 22, 1901.

Line "H," November 9, 1901.

Line "J," August 13, 1901.

Over sixteen thousand (16,000) tons of straight pipe and five hundred and twenty-eight (528) tons of specials are included under this contract.

The average number of men employed per day has been three hundred and fifty-seven (357).

Date of receipt of bids, April 17, 1901.

Award made to Daniel J. McNichol, Philadelphia, on April 29, 1901.

Contractor ordered to begin work on all lines June 10, 1901.

	Line.	Months.	Time Expires.	Condition of Work.
Time.	"A"	8	February 10, 1902.	63 per cent. done.
	"B"	5	November 10, 1901.	75 per cent. done.
	"C"	7	January 10, 1902.	Work not started.
	"D"	4	October 10, 1901.	Work not started.
	"E"	2	August 10, 1901.	Work not started.
	"F"	5	November 10, 1901.	Work not started.
	"G"	3	September 10, 1901.	Work not started.
	"H"	1	July 10, 1901.	Completed Nov. 22, 1901.
	"J"	8	February 10, 1902.	Completed Dec. 31, 1901.
Lower Roxborough Reservoir		2	August 10, 1902.	Work not started.
Frankford Creek			July 1, 1901.	Work not started.

Limit of contract, seven hundred and fifty-thousand ($750,000) dollars.

Total payments made Contractor, four hundred eighty-eight thousand one hundred fifty-three dollars and eight cents ($488,153.08).

Fred. Schaffhauser, Assistant Engineer in charge. H. V. B. Osbourn, Second Assistant Engineer. Chester F. Drake, Third Assistant Engineer. Inspectors, Jas. D. Brooker, Samuel Long, Alex. F. Craig, Charles Kessler, Alex. Fillis, Samuel Andrews.

Two 30″ Water Mains, Silverwood Street. January 18, 1902.

The inspection of the pipe and specials is being conducted by the regular corps of the Bureau of Water, supplemented by special assistants.

Contract No. 18.

LOW SERVICE PUMPING ENGINES, UPPER ROXBOROUGH FILTERS.

The work embraced under this contract consists of the design, construction, delivery, erection, starting and operating for a definite period, three (3) vertical, compound, condensing, receiver, crank and fly wheel engines, each with a maximum easy capacity of ten (10) million gallons in twenty-four (24) hours against a static head of twenty-five (25) feet with steam pressure of one hundred (100) pounds.

The pumps and engines are to be erected and operated in a new pumping station to be constructed as an extension to the present Roxborough Auxiliary Pumping Station, at Eva Street, South of Shawmont avenue, in the Twenty-first Ward, for the purpose of pumping water from the Upper Roxborough Reservoir, with the elevation of high water at four hundred and fourteen (414) feet, to the Upper Roxborough Filters, with an elevation of four hundred and nineteen (419) feet.

Date of receipt of bids, July 29, 1901.

Award made on August 14, 1901, to Henry R. Worthington, Inc., Brooklyn, N. Y.

Contractor ordered to begin work on September 4, 1901.

Time, five (5) months.

Contract time expires February 4, 1902.

Limit of contract, twenty-three thousand five hundred ($23,500) dollars.

No payments made to the Contractor.

Inspector, Harry M. Hillegass.

Contract No. 19.

EXTENSION OF PIPE SYSTEM, UPPER ROXBOROUGH, BELMONT AND WEST PHILADELPHIA.

The work under this contract consists in furnishing, delivering and laying certain lines of distribution and pumping mains with their valves, stop boxes and other appurtenances.

The pipe lines are lettered from "K" to "R" inclusive, and are located as follows:

Line "K." From the Belmont Filtered Water Basin, Monument avenue and Belmont avenue.

Lines "L." From Belmont Pumping Station through the Park to the intersection of Belmont and Midvale avenues, on Belmont avenue and Ford road to Upper Belmont Subsiding Basin.

Lines "M." Supply and discharge pipes connected with Upper Roxborough Reservoir and Low Service Pumping Machinery in Eva street, Port Royal avenue and Hagy street.

Line "N." Distribution pipe from Upper Roxborough Filters and Clear Water Basin on Port Royal avenue, Hagy street and Eva street.

Line "O." Drain from upper level of Upper Roxborough Filters to effluent pipes from Sedimentation Basins.

Lines "P." Connecting pipes at and near the standpipe at Roxborough Auxiliary Pumping Station.

Line "Q." On Locust street from Forty-fifth street to Fifty-second street.

Line "R." From standpipe at Georges Hill to Wynnefield avenue, in Wynnefield avenue, Overbrook avenue, Fifty-ninth street, Woodbine avenue and Sixty-third street to Lansdowne avenue.

Bids for this work were received on July 29, 1901, but

no award was made. The work was readvertised on December 18, 1901.

Date of receipt of bids, December 18, 1901.

Award made December 23, 1901, to Daniel J. McNichol, Philadelphia.

Time, from date of notice to proceed with the work.

Line "K", 6 months.
Line "L", 6 months.
Line "M", 5 months.
Line "N", 4 months.
Line "O", 3 months.
Line "P", 2 months.
Line "Q", 3 months.
Line "R", 4 months.

Contractor has not been ordered to begin work.

Limit of contract, four hundred sixty thousand ($460,000) dollars.

Contract No. 20.

PUMPING MACHINERY FOR UPPER ROXBOROUGH SAND EJECTORS AND WASHERS.

The work covered under this contract consists of furnishing, delivering and erecting two (2) Vertical Triplex Piston Pumps, and two (2) Gasoline Driving Engines, including pipes, valves and all appurtenances to be installed in the building at the site of the Upper Roxborough Filters. These Pumps are designed to take water from the filtered water basin and discharge it against a head of one hundred and eighty-four (184) feet to the sand ejectors which convey the scraped sand from the filters to the sand washers, and also pump to the sand washers. Bidders to furnish detailed plans and specifications covering points not set forth in the Department specification.

Date of receipt of bids, December 18, 1901.

No award has yet been made, pending an examination of the merits of the several designs submitted.

Contract No. 21.

PUMPING STATION FOR LOW SERVICE PUMPING ENGINES, UPPER ROXBOROUGH FILTERS.

This contract consists in the construction of an addition to the present Roxborough Auxiliary Pumping Station, situated at the intersection of Shawmont avenue and Eva street, in the Twenty-first Ward, and designed for the accommodation of the Low Service Pumping Machinery contracted for under Contract No. 18, for raising the raw water from the Upper Roxborough Reservoirs to the level of the Upper Roxborough Filters on Port Royal avenue. The building is in every respect a continuation of the present architectural features of the existing station, the addition being located between the present north end of the station and the stand pipe. The contract includes the foundations for the Low Service Pumps, Contract No. 18.

Date of receipt of bids, September 25, 1901.

Award made to Henderson & Company, Philadelphia, on September 27, 1901.

Contractor ordered to begin work October 28th, 1901.

Time, five (5) months.

Contract time expires March 28th, 1902.

Contractor began work October 23rd, 1901.

Limit of contract, twenty-one thousand ($21,000) dollars.

Total payments made to Contractor, two thousand two hundred twenty dollars and thirty-nine cents ($2,220.39).

The execution of the work in the field is under the supervision of Mr. Frank R. Fisher, Assistant Engineer. Inspector, H. W. Nelson. J. A. Colby is Inspecting Engineer for the structural steel work.

Contract No. 22.

HAND TRAVELING CRANE FOR UPPER ROXBOROUGH LOW SERVICE PUMPING STATION.

This contract consists in the design, manufacture and erection of a hand traveling crane capable of raising a load of six (6) tons, and located in the low service pumping room of the Roxborough Auxiliary Pumping Station being erected under Contract No. 21. The work also includes the furnishing and erection of the runway rails for the crane. The distance center to center of runway rails is fifty (50) feet eight (8) inches, and the length of the runway fifty (50) feet.

Date of receipt of bids, July 29th, 1901.

Award made to Alfred Box & Company, Philadelphia, on October 28th, 1901.

Contractors have not yet been ordered to begin work.

Time, three (3) months.

Limit of contract, two thousand nine hundred ($2,900) dollars.

Contract No. 23.

PUMPING STATION AND ADMINISTRATION BUILDING, UPPER ROXBOROUGH FILTERS.

This contract consists of a building at the site of the Upper Roxborough Filters for Administration purposes, and for the pumping machinery for operating the sand washers (see Contract No. 20). The plans for this work are well under way, but the work has not yet been advertised.

Contract No. 24.

COLLECTOR PIPES AND FILTERING MATERIALS FOR UPPER AND LOWER ROXBOROUGH FILTERS AND SAND WASHERS FOR LOWER ROXBOROUGH FILTERS.

The work under this contract consists in furnishing,

delivering and placing the necessary filter sand and gravel with the terra-cotta lateral collectors in the filters at Upper Roxborough and Lower Roxborough, and the construction of the two (2) sand washers for the Lower Roxborough filters.

Drawings for this work show three (3) methods of placing the filtered gravel, viz.:

Plan "A."—Consists in placing the filter gravel fifteen (15) inches distant from the piers, and at the distances shown from the end and dividing walls.

Plan "B."—Consists in placing the filter gravel at the distance shown from the end and dividing walls, but abutting against the piers.

Plan "C."—Consists in placing the filter gravel in horizontal layers abutting against the piers, end and dividing walls.

In the five (5) filters at Lower Roxborough the filter gravel is to be placed according to Plan "A" in Filters Nos. 1 and 5; according to Plan "B" in Filters Nos. 2 and 4, and according to Plan "C" in Filter No. 3.

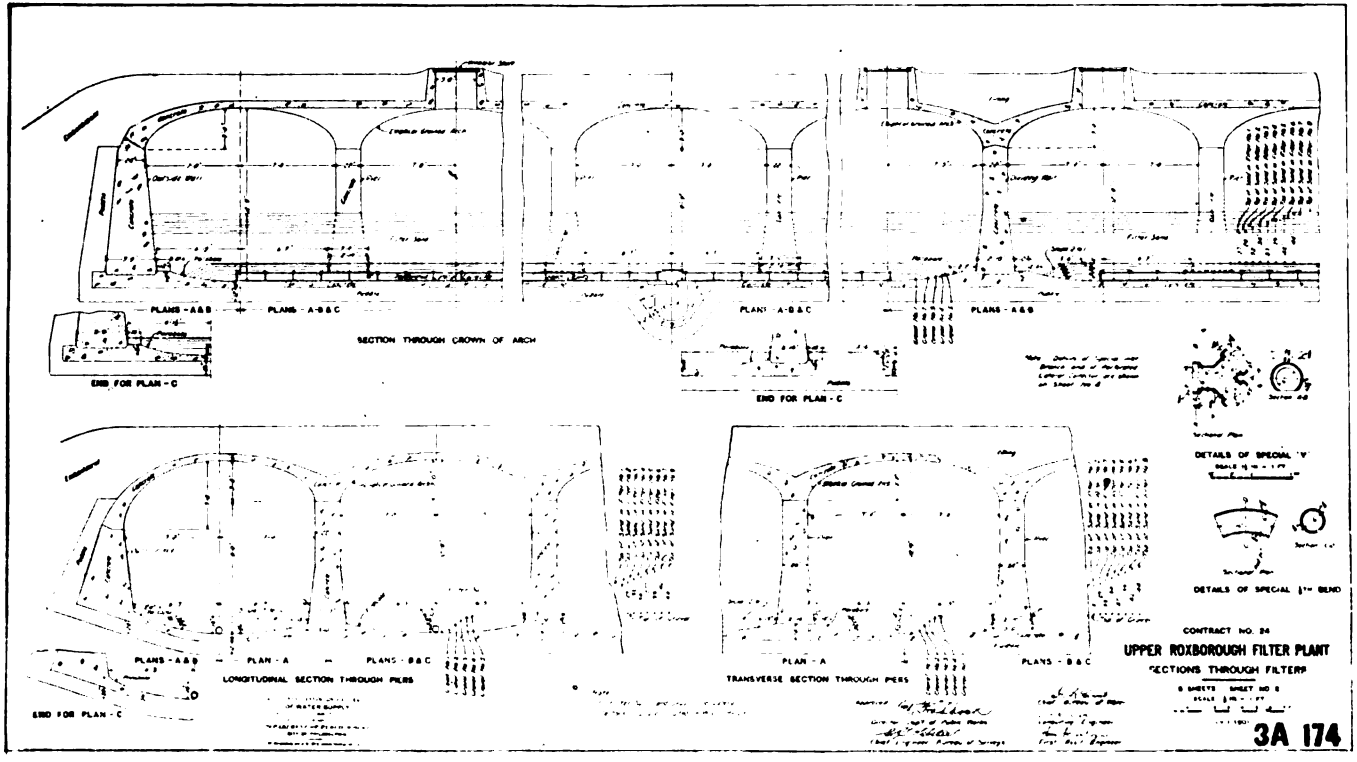
The bids for the Upper Roxborough plant are asked so that either of the above mentioned plans may be used.

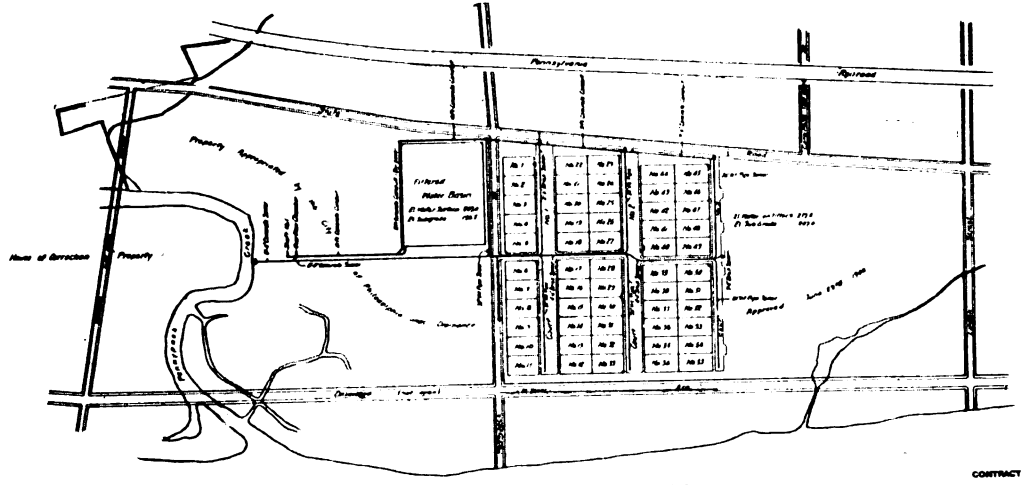
Five (5) sizes of filter gravel are specified:

	To pass a sieve.	To be retained upon sieve.
No. 1,	3 inch mesh,	1¾ inch mesh.
No. 2,	1¾ inch mesh.	⅝ inch mesh.
No. 3,	⅝ inch mesh,	¼ inch mesh.
No. 4,	¼ inch mesh,	14 meshes per inch.
No. 5,	14 meshes per inch,	20 meshes per inch.

The depths are specified as follows:

No. 1,	6 inches.
No. 2,	4 inches.
No. 3,	3 inches.
No. 4,	2 inches.
No. 5,	1 inch.
Total,	16 inches.





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Gravels No. 1 and No. 2 may be either rounded gravel, broken trap or granite rock. Gravels No. 3, No. 4 and No. 5 must be rounded gravel only, screened from deposits of a sandy nature. No gravel shall contain more than two (2) per cent. of lime, magnesia or other matter soluble in in water or a weak solution of hydrochloric acid.

All sand is of one (1) grade, placed to the depths shown on the drawings. It shall be clean river, beach or bank sand, or crushed rock, with either sharp or rounded grains, and composed of a material that will not disintegrate. It shall contain at least ninety-five (95) per cent. of silica calculated as $S_i O_2$.

The size of the sand grains are specified as follows:

Least effective size	**0.26 m.m.**
Greatest effective size	**0.35 m.m.**
Least uniformity coefficient	**1.50**
Greatest uniformity coefficient	**2.60**

Bids for this work were received July 29th, 1901, but no awards were made. The work was readvertised on December 18th, 1901, and contract was awarded December 23rd, 1901, to Daniel J. McNichol, Philadelphia.

Time—Lower Roxborough Filter plant, six (6) months; Upper Roxborough Filter plant, nine (9) months.

Sand washers at Lower Roxborough Plant, three (3) months.

Limit of contract, two hundred ninety thousand ($290,000) dollars.

The Contractor has not yet been ordered to begin work.

Contract No. 25.

TORRESDALE FILTERS.

The work under this contract consists of a filter plant situated on land appropriated by the City on the Delaware river, between Linden avenue and Pennypack creek, and between the Pennsylvania Railroad and the river, in the Forty-first Ward.

A general plan of the plant accompanies this report. It consists of fifty-five (55) covered sand filters, courts for storing and washing sand, located northeast of Pennypack street, which passes through (about) the centre of the tract, from State road to the Delaware river. To the southwest of Pennypack street a covered filtered water basin is located.

While the topography of the ground is generally good, it is necessary, as at Belmont, to build some filters on a fill.

The filters are all rectangular in shape, twenty-three (23) filters measuring one hundred and forty (140) feet eight (8) inches by two hundred and thirty-five (235) feet eight (8) inches, and twenty-two (22) measuring one hundred and thirty-three (133) feet two (2) inches by two hundred and fifty-three (253) feet two (2) inches. Each of the first twenty-three (23) filters has an area of, approximately, thirty-two thousand five hundred (32,500) square feet, or .747 acres net filtering area at the normal sand lime; the last twenty-two (22) filters an area of, approximately, thirty-three thousand (33,000) square feet, or .758 acres at the normal sand line. Assuming a nominal rate of filtration of three million (3,000,000) gallons per twenty-four hours, and an average net area of .75 acre, all filters will yield, approximately, one hundred million (100,000,000) gallons per day. Sufficient land has been acquired by the City to extend the plant ultimately to a capacity of three hundred million (300,000,000) gallons daily.

The general construction of the filters will be similar to those under Contracts Nos. 10, 12 and 16; the floors, piers, walls, vaulting and puddle lining being essentially the same. Where the floors are built over a fill expanded metal, three (3) inch mesh, No. 10, will be imbedded in the concrete inverts.

General View, Torresdale Filter Site. August 20, 1901.

The arrangement of the regulating houses is similar to those on Contracts Nos. 12 and 16; that is, a single building placed at the end of the dividing wall between two filters contains a combined dry chamber for the inlet regulating apparatus for both filters and a separate wet outlet chamber for each filter.

The filtered water basin is rectangular in plan, measuring six hundred and one (601) feet ten (10) inches by seven hundred and sixty-two (762) feet two (2) inches on the neat lines, and has an available depth of fifteen (15) feet for storing filtered water. It will have a capacity of fifty million (50,000,000) gallons at the normal water line, which is equivalent to about one-half ($\frac{1}{2}$) the nominal capacity of the filters. In general construction the basin will be similar to the filters, except that the piers supporting the vaulting are square for their full length and not battered at the base, and in the construction of the vaulting, in which special provision is made for drainage.

The filtered water passes into the filtered water basin at one corner through an inlet gate house, and out through a special gate house at another corner, or it can pass entirely around the basin, without entering it, through a concrete conduit eight (8) feet in diameter. The main conduits leading to and from the basin are built of concrete and expanded metal, and are ten (10) feet in diameter. The water upon leaving the basin passes to Shaft No. 1 of the Filtered Water Conduit, built in tunnel, and thence by gravity to the Pumping Station at Lardner's Point.

The main drainage of the plant is carried generally from northeast to southwest by means of a sewage system leading from State road, Pennypack street and the several courts between the filters, and discharging into Pennypack creek through a main outlet sewer eight (8) feet six (6) inches in diameter.

The raw water to supply the filters will be taken from

sedimentation basins, built in the Delaware river at the foot of Pennypack street, by means of low lift pumps, and delivered to the several courts of the filters through a number of lines of forty-eight (48) inch cast iron mains on the line of Delaware avenue toward Linden avenue. On account of the location of Delaware avenue it will be necessary to support the raw water pipe lines for a considerable distance upon piles and platforms.

Provision is made in the layout of the whole plant for an installation of Preliminary Filters to treat the water at times of excessive turbidity. Considerable ground is reserved for this purpose.

The layout of the plant also contemplates a railroad connection from the Pennsylvania Railroad along the side of Pennypack street to Delaware avenue, where the Low Service Pumping Stations will be located.

An office for the use of the Engineer Corps engaged upon the work is included in the contract.

As in the case of the other contracts of a similar character, no filtering materials or sand washing machinery is included.

Date of receipt of bids, December 18th, 1901.

Award made to Daniel J. McNichol, Philadelphia, December 23d, 1901.

Time, seven hundred and eighty (780) working days.

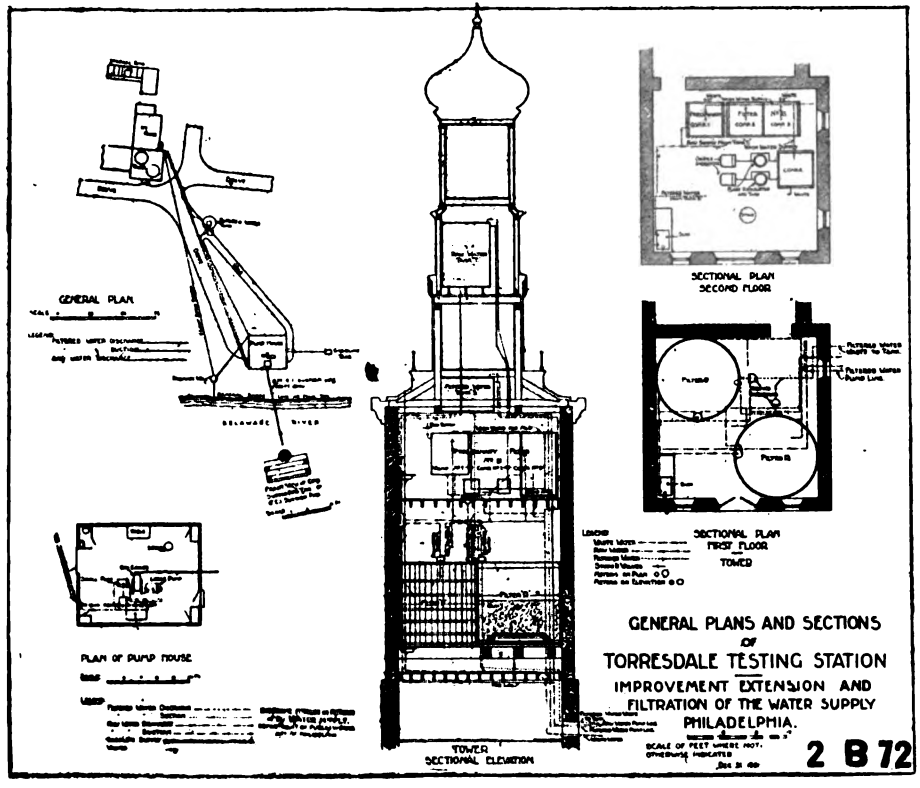
Limit of contract, five million ($5,000,000) dollars.

The Contractor has not been ordered to begin work.

Contract No. 26.

TORRESDALE TESTING STATION.

Plans and specifications were prepared for the installation of a Testing Station located upon the ground appropriated by the City for the Torresdale Filter Plant, for the purpose of investigating the character of the water of the Delaware river.



The filters are located in the tower of the old Harrison Mansion on the above tract, and are described and shown in detail under the head of "Testing Station."

The work covered under this contract consists of four (4) items, viz.:

1st. Gasoline Engine.

2d. Two (2) Triplex Power Pumps.

3d. A pipe line from the channel of the river to the pumps, and all other pipe connections to the filters.

4th. A frame building for the pumps and engine, and certain carpenter work in connection with the filter tank room.

The gasoline engine has sufficient power to operate two (2) power pumps at the same time, and is capable of delivering against a total head of one hundred (100) feet. One (1) pump has a capacity of one hundred and fifty (150) gallons, and the other of fifty (50) gallons per minute. The pump house is connected with the river channel, near the "Hen and Chickens," with a six (6) inch cast iron pipe, and all the piping necessary to connect the pumps with the tanks and filters in the Harrison Mansion is included.

The pump house, located between the mansion and the river, contains the engine and pumps, and is also part of the contract.

The work above described has been practically completed, there remaining but a small amount of interior painting, delayed on account of the wet condition of the building, caused by leakage of the tanks furnished by another contractor.

Date of receipt of bids, July 29th, 1901.

Award made on August 2d, 1901, to Patrick Gormley, Philadelphia.

Contractor was ordered to begin work on September 12th, 1901.

Time, sixty (60) days.

Time expires November 22d, 1901.

Contractor began work August 13th, 1901.

Limit of contract, nine thousand ($9,000) dollars.

Total payment made Contractor, six thousand seven hundred sixty-nine dollars and ninety-eight cents ($6,769.98).

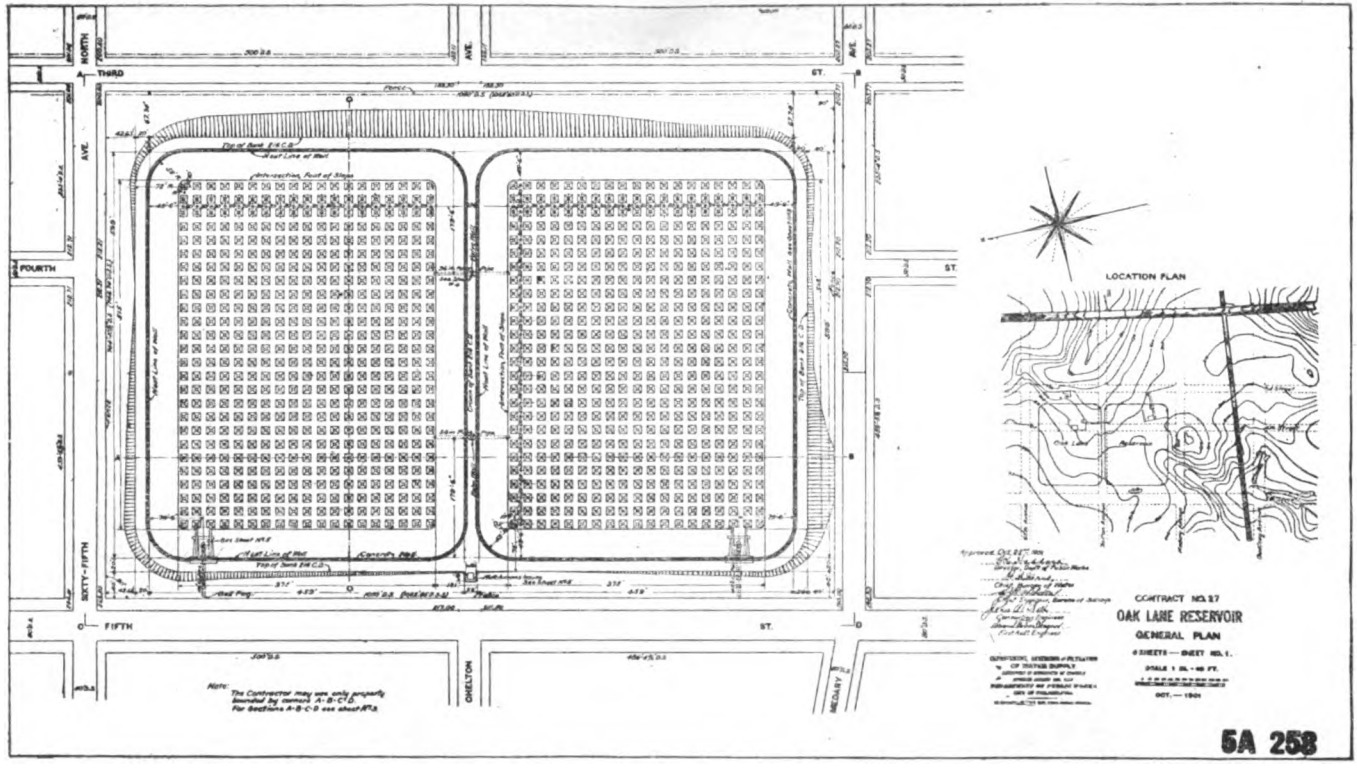
The execution of the work was under the supervision of Charles Gilman Hyde, Assistant Engineer in Charge of the Testing Station. Howard W. Underwood, Inspector.

Contract No. 27.

Oak Lane Reservoir.

The work under this contract consists of the construction of a distributing and compensating reservoir to be used in connection with the use of the filtered water from the Torresdale Filter Plant. The reservoir will be located between Fifth and Third street and Sixty-fifth avenue north and Medary avenue, in the Twenty-second Ward, upon ground appropriated for that purpose.

The reservoir, which will have a total capacity of seventy million (70,000,000) gallons, consists of two (2) basins, each five hundred and ninety-nine (599) feet by four hundred and fifty-nine (459) feet on the high water line, which is at an elevation of 210 feet above City Datum. The inside and outside slopes are each one on two, the inside depth from the water line to the top of lining of the bottom being twenty (20) feet six (6) inches. The embankments are to be made of selected material obtained from the excavation, of which the borings made over the site show that there is abundance. The slopes on the dividing wall are the same as on the main banks. The lining consists of eighteen (18) inches of clay puddle on floor and slopes covered with five (5) inches of Portland cement concrete mixed 1-3-5, and finished with three-



quarters ($\frac{3}{4}$) of an inch of Neufchatel asphalt placed as described for the lining of the Sedimentation Reservoir at Belmont. The concrete on the floor consists of inverted vaulting placed so as to provide seats for columns should it ever be found necessary to cover the reservoir. These seats are placed on twenty (20) feet centres. A concrete curbing is placed around the top of the inside slope and provided with seats for girders in case a covering is needed. Two (2) thirty-six (36) inch equalizing pipes are located in the division wall to connect the two basins, and a chamber is placed in each basin with a forty-eight (48) inch connection to the street mains. As the reservoir will contain nothing but filtered water no arrangements are necessary for sedimentation purposes.

Bids were received December 18th, 1901.

Contract awarded to R. A. Malone & Co., Lancaster, Pa., December 23d, 1901.

Limit of contract, five hundred and fifty thousand ($550,000) dollars.

Time, fifteen (15) months.

The Contractor has not been ordered to begin work.

Contract No. 28.

LARDNER'S POINT DISTRIBUTION SYSTEM.

The work on this contract consists in the laying of the distribution mains for carrying the filtered water from the Lardner's Point Pumping Station to the present Frankford, East Park, Queen Lane, Fairmount and Corinthian Districts, and to the new Oak Lane Reservoir to be constructed under Contract No. 27.

A large amount of studies and plans have been made for this contract but the work has not yet been advertised.

Contract No. 29.

RECONSTRUCTION OF WENTZ FARM RESERVOIR.

This contract consists of the work of reconstructing the Wentz Farm Reservoir, in the Thirty-fifth Ward, by relining it so that it will be capable of holding water to the high water line. This reservoir, under the new system, will act together with the Oak Lane Reservoir as a compensating and distributing reservoir for the filtered water from the Torresdale Filters.

The plans and specifications have been prepared, but the work has not yet been advertised.

Contract No. 30.

LARDNER'S POINT PUMPING STATION.

The work covered by this contract consists of the construction of the foundations and superstructures of Engine Houses Nos. 2 and 3, Boiler Houses Nos. 2 and 3, Administration Building, Dynamo Building, Shaft House, Smoke Tunnels, Chimneys, Pump Wells, Water Conduits, Connection to the Delaware River, Wharf, Gate Chambers, Sluice Gates, Injection Mains, Sewers, Pipes, Engine Foundations, Boiler Foundations, Pumps and all other necessary details for the Pumping Station to be located at Lardner's Point, to supplement the present station, and to pump the filtered water from the Torresdale Filter Plant to the distribution districts of East Park, Queen Lane, Fairmount, Corinthian and Wentz Farm. The plant will be located on the property of the City and other ground recently appropriated between Delaware avenue and Milnor street, and between Robbins and Levick streets, in the Forty-first Ward.

The three (3) twenty million (20,000,000) gallon pumping engines, with their boilers, contracted for under Con-

tract No. 11, as well as certain pumping machinery to be moved from the present Spring Garden Station, will be placed in these buildings.

The drawings and specifications for this work are now completed, but bids have not been asked.

Contract No. 32.

EXTENSION OF SPRING GARDEN TESTING STATION.

The work under this contract consists of an extension to the Chemical and Bacteriological Laboratories at the Spring Garden Pumping Station in order to provide additional room for the increased work caused by the starting of the Torresdale Station. Bids were received for this work on September 25th, 1901, but no award has been made. An effort is now being made to reduce the size of the additions and the consequent cost.

Respectfully submitted,

JOHN W. HILL,
Consulting Engineer.

Approved:

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

SAMUEL TOBIAS WAGNER,
First Assistant Engineer.

GEO. S. WEBSTER,
Chief Engineer, Bureau of Surveys.

List of Contracts, Improvement, Extension, and Filtration of Water Supply, according to Ordinance of January 12, 1900.

Contract No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Date of Final Payment.
1 1 Sup.	A Testing Station..... Extension to Testing Station.....	Thomas Parker ..... Thomas Parker	Feb. 27, 1900..	Mar. 6, 1900.. May 7, 1900..	$9,000 00 5,000 00	11,653 54	July 13, 1900.
2	Ice Refrigerating Machine.....	Newburg Ice & Machine Eng. Co.....	July 20, 1900..	Aug. 20, 1900..	800 00	768 56	Nov. 19, 1900.
3	Filter Gravel and Sand for Testing Station.....	Norcross & Edmunds	July 20, 1900..	Sept. 4, 1900..	2,500 00	1,016 54	Contract completed.
4	Platinum Ware for Testing Station....	Chas. Lentz & Sons..	July 20, 1900..	July 27, 1900..	674 50	649 50	Oct. 31, 1900.
5	Test Borings	Flaghouse & Beeson.	Aug. 7, 1900..	Sept. 6, 1900..	9,750 00	8,833 30	Mar. 9, 1901.
6	Platinum Ware for Testing Station....	Arthur H. Thomas Co	Dec. 12, 1900..	.....	444 95	444 95	Feb. 6, 1901.
7	Water Filter Plant at Lower Roxborough Reservoir.....	.....	Dec. 12, 1900..	No award made. Readvertised as Contract No. 10.			

List af Contracts, Improvements, Extension and Filtration of Water Supply, according to Ordinance of January 12, 1900—Continued.

Contract No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment	Date of Final Payment.
8	Sand Ejector	Patrick Gormly	Apr. 17, 1901.	May 6, 1901.	$1,803 00	$1,712 03	Aug. 7, 1901.
9	Cast Iron Water Pipe, Special Castings, Stop Valves, Pipe-laying, etc.	Bids rejected on Pipe rest of contract.	Lines "A to	J" inclusive.	See Contra	cts "9 A,"	"9 B," and "9 C" for
9 A	Gray Iron Castings for Stop Boxes, Frames and Covers	J. Alfred Clark	Feb. 11, 1901.	May 14, 1901.	2,100 00	1,563 80	December 21, 1901.
9 B	Stop Valves, Check Valves, Indicator Stands and Extension Stems	Eddy Valve Co.	Feb. 11, 1901.	May 3, 1901.	17,000 00	14,403 06	December 21, 1901.
9 C	Cast Iron Water Pipes, and Special Castings and Flange Pipe, and Flanged Special Castings, for Lower Roxborough Filter, and for Hydrant connections and miscellaneous pipes.	Daniel J. McNichol.	Feb. 11, 1901.	May 8, 1901.	7,500 00	7,488 14	December 20, 1901.
10	Water Filter Plant at Lower Roxborough Reservoir	Daniel J. McNichol.	Feb. 11, 1901.	Mar. 20, 1901.	250,000 00	152,120 28	Not completed.

List of Contracts, Improvement, Extension and Filtration of Water Supply, according to Ordinance of January 12, 1900—Continued.

Contract No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Date of Final Payment.
11	Pumping Engines and Boilers and Electric Traveling Crane, for the Frankford Pumping Service, Lardner's Point	Holly Mf'g Co.	May 1, 1901	June 6, 1901	$369,000 00	.....	No payments made.
12	Water Filter Plant at Upper Roxborough Reservoirs	Daniel J. McNichol	April 17, 1901	May 8, 1901	549,000 00	121,684 28	Not completed.
13	Patterns, Core Boxes, and Manufacture of Bell End, Gate and Rotary Stop Valves	Eddy Valve Co.	April 17, 1901	June 1, 1901	13,000 00	.....	No payments made.
14	A Filtered Water Conduit from Torresdale Filter Plant to Frankford Pumping Station	Daniel J. McNichol	May 28, 1901	.....	1,350,000 00	.....	No payments made.
15	A Test Pit at Lardner's Point	Contract abandoned.	Work done by	Water Bureau.			
16	Upper Belmont Reservoir and Water Filter Plant	Ryan & Kelly	May 28, 1901	Aug. 7, 1901	2,000,000 00	344,156 56	Not completed.

List of Contracts, Improvement, Extension and Filtration of Water Supply, according to Ordinance of January 12, 1900—Continued.

Contract No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Date of Final Payment
17	Cast-iron Water Pipe, Special Castings, Trenching and Pipe Laying..	Daniel J. McNichol..	April 17, 1901.	June 4, 1901...	$750,000 00	$488,153 08	Not completed.
18	Low Service Pumping Machinery for the Upper Roxborough Filter.....	Henry R. Worthington, Inc.....	July 29, 1901..	Aug. 22, 1901..	23,500 00	.....	No payments made.
19	Cast-iron Water Pipe, Special Castings, Trenching and Pipe Laying...	Daniel J. McNichol..	Dec. 18, 1901..	.....	460,000 00		
20	Triplex Pumps and Gasoline Driving Engines for the Upper Roxborough Filters.....	No award made	Dec. 18, 1901..				
21	Low Service Pumping Station for Upper Roxborough Filters.....	Henderson & Co.....	Sept. 25, 1901.	Oct. 21, 1901..	21,000 00	2,220 39	Not completed.
22	Hand Traveling Crane for the Low Service Pumping Station of the Upper Roxborough Filters.....	Alfred Box & Co.....	July 29, 1901..	.....	2,900 00	.....	No payments made.

List of Contracts, Improvement, Extension and Filtration of Water Supply, according to Ordinance of January 12, 1900—Continued.

Contract No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Date of Final Payment.
23	Administration Building and Pumping Station at Upper Roxborough Filters, and shelter and Storehouse at Lower Roxborough Filters.						
24	Filtering materals and Underdrains for the Upper and Lower Roxborough Water Filter Plants and Sandwashers for Lower Roxborough	Daniel J. McNichol..	Dec. 18, 1901..	.....	$290,000 00		
25	Water Filter Plant at Torresdale	Daniel J. McNichol..	Dec. 18, 1901..	.....	5,000,000 00		
26	Testing Station at Torresdale Filter Plant.....	Patrick Gormly.....	July 29, 1901..	Aug. 20, 1901..	9,000 00	$6,769 98	Not completed.
27	Oak Lane Reservoir.....	R. A. Malone & Co...	Dec. 18, 1901..	.....	550,000 00		
28	Lardner's Point Distribution.....						

List of Contracts, Improvement, Extension and Filtration of Water Supply, according to Ordinance of January 12, 1900—Continued.

Contract No.	Description of Contract.	Contractor.	Date of Letting.	Date of Contract.	Limit of Contract.	Payment.	Date of Final Payment.
29	Reconstruction of Wentz Farm Reservoir						
30	Engine and Boiler House, Electrical Power House, Pump-well, Conduits, River Connection, etc., for the Lardner's Point Pumping Station.....						
31	Lardner's Point Coal Machinery and Pockets						
32	Extension to Testing Station at Spring Garden Pumping Station..	.....	Sept. 25, 1901..	No award made.			

CONTRACT PRICES.

IMPROVEMENT, EXTENSION, AND FILTRATION OF WATER SUPPLY.

Ordinances of January 12, 1900.

Contract No. 1 and No. 1 Sup.

A TESTING STATION.

Thomas Parker, Contractor.

Building (lump sum)		$2,504 00
Excavation, including refilling	per cu. yd.	0 15
Concrete	per cu. yd.	5 78
Brick masonry	per cu. yd.	9 72
Additional Y. P. lumber	per M. ft. B. M.	32 50
Additional W. P. barn boards	per M. ft. B. M.	32 50
Additional hemlock lumber	per M. ft. B. M.	22 50
Lumber for retaining bank, etc.	per M. ft. B. M.	20 00

Contract No. 2.

ICE REFRIGERATING MACHINE FOR TESTING STATION.

Newburg Ice Machine and Eng. Co., Contractors.

Refrigerating machine and motor (lump sum)	$800 00

Contract No. 3.

FILTER SAND AND GRAVEL FOR TESTING STATION.

Norcross and Edmunds, Contractors.

63 millimeter gravel	per cu. yd.	$3 85
21 millimeter gravel	per cu. yd.	3 85
8 millimeter gravel	per cu. yd.	3 85
3 millimeter gravel	per cu. yd.	3 85
1 millimeter gravel	per cu. yd.	2 65
0.08 to 0.15 millimeter sand	per cu. yd.	2 65
0.15 to 0.25 millimeter sand	per cu. yd.	2 65
0.25 to 0.35 millimeter sand	per cu. yd.	2 65
0.35 to 0.45 millimeter sand	per cu. yd.	2 65
0.45 to 0.55 millimeter sand	per cu. yd.	2 65

Contract No. 4.

PLATINUM WARE FOR TESTING STATION.

Chas. Lentz & Sons, Contractors.

Platinum Ware for Testing Station (lump sum) $674 50

Contract No. 5.

TEST BORINGS.

Flaghouse & Beeson, Contractors.

Boring through drift	per vert. ft.	$2 75
Boring through rock	per vert ft.	5 96
Permanent water seals	each	2 00
Temporary water seals	each	3 00

Contract No. 6.

PLATINUM WARE FOR TESTING STATION.

Arthur H. Thomas Co., Contractors.

Platinum Ware for Testing Station (lump sum) $444 95

Contract No. 8.

SAND EJECTOR.

Patrick Gormly, Contractor.

Sand Ejector (lump sum)		$1,106 00
Four inch wrought iron pipe	per lin. ft.	0 60
Additional Y. P. timber and planking	per M. ft B. M.	55 00
Excavation	per cu. yd.	2 25

Contract No 9A.

GREY IRON CASTINGS FOR STOP BOXES, FRAMES AND COVERS.

J. Alfred Clark, Contractor.

Grey Iron Castings for Stop Boxes, Frames and Covers per lb. $0 015

Contract No. 9B.

STOP VALVES AND CHECK VALVES, INDICATOR STANDS, EXTENSION STEMS, STOP BOXES, FRAMES AND COVERS.

The Eddy Valve Co., Contractors.

48 inch hub end stop valves, geared to lay on side, with bye pass ..... each $1,100 00

48 inch hub end stop valves, geared to lay on side, without bye pass	each	$1,050 00
48 inch hub end stop valves, geared to stand upright, with bye pass	each	1,085 00
48 inch hub end stop valves, geared to stand upright, without bye pass	each	1,035 00
48 inch hub end stop valves, without gearing, with bye pass	each	1,035 00
48 inch hub end stop valves, without gearing, without bye pass	each	985 00
36 inch hub end stop valves, geared to lay on side, with bye pass	each	450 00
36 inch hub end stop valves, geared to lay on side, without bye pass	each	415 00
36 inch hub end stop valves, geared to stand upright, with bye pass	each	440 00
36 inch hub end stop valves, geared to stand upright, wihout bye pass	each	405 00
36 inch hub end stop valves, without gearing, with bye pass	each	425 00
36 inch hub end stop valves, without gearing, without bye pass	each	385 00
30 inch hub end stop valves, geared to lay on side, with bye pass	each	250 00
30 inch hub end stop valves, geared to lay on side, without bye pass	each	225 00
30 inch hub end stop valves, geared to stand upright, with bye pass	each	240 00
30 inch hub end stop valves, geared to stand upright, without bye pass		215 00
30 inch hub end stop valves, without gearing, with bye pass	each	225 00
30 inch hub end stop valves, without gearing, without bye pass	each	210 00
24 inch hub end stop valves, geared to lay on side, with by pass	each	175 00
24 inch hub end stop valves, geared to lay on side, without bye pass	each	150 00
24 inch hub end stop valves, geared to stand upright, with bye pass	each	165 00
24 inch hub end stop valves, geared to stand upright, without bye pass	each	145 00
24 inch hub end stop valves, without gearing, with bye bye pass	each	155 00
24 inch hub end stop valves, without gearing, without bye pass	each	139 00

20 inch hub end stop valves, geared to lay on side, without bye pass	each	$95 00
20 inch hub end stop valves, geared to stand upright, without bye pass	each	95 00
20 inch hub end stop valves, without gearing without bye pass	each	90 00
16 inch hub end stop valves	each	60 00
12 inch hub end stop valves	each	32 00
10 inch hub end stop valves	each	23 00
8 inch hub end stop valves	each	18 00
6 inch hub end stop valves	each	11 00
30 inch flange stop valves, without bye pass	each	225 00
30 inch flange stop valves, with bye pass	each	240 00
24 inch flange stop valves, without bye pass	each	145 00
24 inch flange stop valves, with bye pass	each	165 00
20 inch flange stop valves, without bye pass	each	90 00
16 inch flange stop valves, without bye pass	each	60 00
12 inch flange stop valves, without bye pass	each	32 00
6 inch flange stop valves, without bye pass	each	12 40
4 inch flange stop valves, without bye pass	each	7 50
Indicator stands, with hand wheels and spindles, for 30 inch stop valves	each	10 00
Indicator stands, with hand wheels and spindles, for 24 inch stop valves	each	10 00
Indicator stands, with hand wheels and spindles, for 20 inch stop valves	each	10 00
Indicator stands, with hand wheels and spindles, for 16 inch stop valves	each	10 00
Indicator stands, with hand wheels and spindles, for 12 inch stop valves	each	10 00
W. I. Extension Stems for stop valves, all sizes, per lb..		0 04
20 inch flange check valves		120 00
12 inch flange check valves		35 00

Contract No. 9C.

CAST IRON WATER PIPE, SPECIAL CASTINGS AND FLANGE PIPE AND FLANGE SPECIAL CASTINGS FOR THE LOWER ROXBOROUGH FILTERS, AND FOR HYDRANT CONNECTIONS AND MISCELLANEOUS PIPE.

Daniel J. McNichol, Contractor.

30 inch Cast Iron Water Pipe, Class "C"	per ton	$25 00
24 inch Cast Iron Water Pipe, Class "C"	per ton	25 00
20 inch Cast Iron Water Pipe, Class "C"	per ton	26 00

16 inch Cast Iron Water Pipe, Class "C"	per ton	$26 00
12 inch Cast Iron Water Pipe, Class "C"	per ton	26 00
10 inch Cast Iron Water Pipe, Class "C"	per ton	26 00
6 inch Cast Iron Water Pipe, Class "C"	per ton	26 00
4 inch Cast Iron Water Pipe, Class "C"	per ton	26 00
3 inch Cast Iron Water Pipe, Class "C"	per ton	26 00
Special castings, 20 inch diameter and larger	per ton	48 00
Special castings under 20 inch diameter	per ton	48 00
Breeches pipes, including drilling, bolts and nuts,	per ton	103 00
Quarter turns, 20 inches diameter and larger	per ton	48 00
Quarter turns under 20 inches diameter	per ton	48 00
Cast Iron flange pipe and specials, 30 inch to 3 inch,	per ton	38 00

Contract No. 10.

WATER FILTER PLANT AT LOWER ROXBOROUGH RESERVOIR.

Daniel J. McNichol, Contractor.

Filter Plant and Basin, complete		$227,983 29
Additional concrete	per cu. yd.	10 00
Additional steel or cast iron	per lb.	0 10

Contract No. 11.

PUMPING ENGINES AND BOILERS AND ELECTRIC TRAVELING CRANE FOR THE FRANKFORD PUMPING SERVICE AT LARDNER'S POINT.

Holly Mfg. Co., Contractors.

Three pumping engines and twelve marine fire box boilers, and one electric traveling crane, complete, ready for service	$352,985 00

Contract No. 12.

WATER FILTER PLANT AT UPPER ROXBOROUGH RESERVOIR.

Daniel J. McNichol, Contractor.

Filter Plant and Basin, complete		$527,594 00
Additional concrete	per cu. yd.	10 00
Additional steel or cast iron	per lb.	0 10

Contract No. 13.

PATTERNS, CORE BOXES AND MANUFACTURE OF BELL END, GATE AND ROTARY STOP VALVES.

The Eddy Valve Co., Contractor.

48 inch Bell end stop valves, without gearing ...	each	$1,100 00
48 inch Bell end stop valves, with horizontal gearing,	each	1,100 00
48 inch Bell end stop valves, with vertical gearing,	each	1,100 00
30 inch Bell end stop valves, without gearing ...	each	325 00
30 inch Bell end stop valves, horizontal gearing..	each	325 00
30 inch Bell end stop valves, vertical gearing	each	325 00
20 inch Bell end stop valves, without gearing ..	each	150 00
20 inch Bell end stop valves, horizontal gearing.	each	158 00
20 inch Bell end stop valves, vertical gearing ...	each	158 00
48 inch Bell end rotary stop valves	each	950 00
36 inch Bell end rotary stop valves	each	675 00
30 inch Bell end rotary stop valves	each	430 00
20 inch Bell end rotary stop valves	each	275 00
Patterns and core boxes, 48 inch geared bell end stop valves	each	400 00
Patterns and core boxes, 30 inch geared bell end stop valves	each	325 00
Patterns and core boxes, 20 inch geared bell end stop valves	each	225 00
Patterns and core boxes, 48 inch bell end rotary stop valves	each	400 00
Patterns and core boxes, 36 inch bell end rotary stop valves	each	400 00
Patterns and core boxes, 30 inch bell end rotary stop valves	each	300 00
Patterns and core boxes, 20 inch bell end rotary stop valves	each	200 00

Contract No. 14.

A FILTERED WATER CONDUIT FROM TORRESDALE FILTER PLANT TO FRANKFORD PUMPING STATION.

Daniel J. McNichol, Contractor.

Filtered water conduit, complete		$1,274,000 00
Additional shaft excavation	per cu. yd.	12 25
Additional tunnel excavation	per cu. yd.	5 95

Additional brick masonry	per cu. yd.	$12 50
Additional concrete	per cu. yd.	8 00
Additional steel	per lb.	0 09
Additional cast iron	per lb.	0 07
Additional conduit	per lin. ft.	96 00
Additional depth permanent shaft	per lin. ft.	300 00
Additional depth working shaft	per lin. ft.	105 00

Contract No. 16.

UPPER BELMONT RESERVOIR AND WATER FILTER PLANT.

Ryan and Kelley, Contractors.

Reservoir, complete		$670,000 00
Filter plant, complete		999,000 00
Filtered water basin, complete		260,000 00
Additional excavation	per cu. yd.	1 50
Additional sodding	per sq. yd.	0 50
Additional granolithic pavement	per sq. yd.	2 25
Additional terra cotta pipe, 12 inches and less,	per lin. ft.	0 50
Additional cast iron water pipe	per ton	40 00
Additional special castings	per ton	90 00
Additional flange pipe and flange special castings,	per ton	140 00
Additional wrought iron, steel or cast iron..	per lb.	0 10

Contract No. 17.

CAST IRON WATER PIPE, SPECIAL CASTINGS, TRENCHING AND PIPE LAYING.

Daniel J. McNichol, Contractor.

Furnishing and laying 48 inch cast iron pipe, any class,	per ton	$34 10
Furnishing and laying 36 inch cast iron pipe, any class,	per ton	34 10
Furnishing and laying 30 inch cast iron pipe, any class,	per ton	34 10
Furnishing and laying 24 inch cast iron pipe, any class	per ton	34 10
Furnishing and laying 20 inch cast iron pipe, any class,	per ton	34 10
Furnishing and laying 16 inch cast iron pipe, any class,	per ton	34 10

Furnishing and laying 12 inch cast iron pipe, any class, per ton		$34 10
Furnishing and laying 10 inch cast iron pipe, any class, per ton		34 10
Furnishing and laying 8 inch cast iron pipe, any class, per ton		34 10
Furnishing and laying 6 inch cast iron pipe, any class, per ton		34 10
Furnishing and laying 48 inch cast iron pipe, hub and flange	per ton	103 40
Furnishing and laying special castings, 20 inches and larger	per ton	70 40
Furnishing and laying special castings under 20 inches, per ton		70 40
Furnishing and laying breeches pipes	per ton	141 90
Furnishing and laying quarter turns, 20 inches diameter and larger	per ton	70 40
Furnishing and laying quarter turns, under 20 inches diameter	per ton	70 40
Earth excavation not more than 6½ feet deep, per cu. yd.		0 83
Earth excavation not more than 10 feet deep, per cu. yd.		0 88
Earth excavation not more than 14 feet deep, per cu. yd.		1 10
Earth excavation not more than 18 feet deep, per cu. yd.		1 38
Earth excavation more than 18 feet deep	per cu. yd.	2 20
Rock excavation, any depth	per cu. yd.	2 48
Hard burned brick in Portland cement mortar ..	per M.	19 80
Natural cement concrete in place	per cu. yd.	6 60
Rubble masonry in natural cement mortar ..	per cu. yd.	5 50
Yellow pine timber in place, complete ..	per M. ft. B. M.	53 90
Hemlock timber in trench foundations,	per M. ft. B. M.	27 50
Wrought iron straps, bars and bolts in place	per lb.	0 10
Repaving asphalt on concrete foundations...	per sq. yd.	3 00
Repaving asphalt on broken stone	per sq. yd.	3 00

Contract No. 18.

LOW SERVICE PUMPING MACHINERY FOR THE UPPER ROXBOROUGH FILTERS.

Henry R. Worthington, Inc., Contractor.

For three (3) low service pumps and compound condensing engines and all pipes, valves and appurtenances, furnished, delivered, erected and completed ready for service	$21,700 00

Contract No. 19.

CAST IRON WATER PIPE AND SPECIAL CASTINGS, EXCAVATION OF WATER PIPE TRENCHES AND PIPE LAYING, STOP VALVES, STOP BOXES, ETC.—FOR PIPE LINES K, L, M, N, O, P, Q and R.

Daniel J. McNichol, Contractor.

Furnishing, delivering and laying 48 inch C. I. water pipe, any class	per ton	$38 00
Furnishing, delivering and laying 36 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 30 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 24 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 20 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 16 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 12 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 10 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 8 inch C. I. water pipe, any class	per ton	38 00
Furnishing, delivering and laying 6 inch C. I. water pipe, any class	per ton	38 00
48 inch, 36 inch, 30 inch Hub and flange and flange special castings, including bolts and gaskets, furnished, delivered and placed	per ton	125 00
Breeches pipes, including drilling and bolts and nuts, all sizes and both classes, furnished delivered and placed	per ton	149 00
Hub and spigot special castings, all sizes and any class, furnished, delivered and placed	per ton	79 00
Earth excavation in trenches not more than 6½ feet deep	per cu. yd.	0 96
Earth excavation in trenches not more than 10 feet deep	per cu. yd.	1 09
Earth excavation in trenches not more than 14 feet deep	per cu. yd.	1 88
Earth excavation in trenches not more than 18 feet deep	per cu. yd.	3 13
Earth excavation in trenches more than 18 feet deep,	per cu. yd.	4 50

Rock excavation, any depth	per cu. yd.	$2 96
Hard burned brick, in Portland cement mortar,	per cu. yd.	25 00
Natural cement concrete	per cu. yd.	8 50
Rubble masonry in natural cement mortar, including excavation	per cu. yd.	10 00
Hemlock timber in pipe trench foundations,	per M. ft. B. M.	40 00
Wrought iron straps, bars and bolts in place ..	per lb.	0 10
48 inch Hub end stop valves, geared and with bye pass,	each	1,265 00
48 inch flange end stop valves, geared and with bye pass,	each	1.265 00
36 inch hub end stop valves, geared and with bye pass,	each	543 00
36 inch flange end stop valves, geared and with bye pass,	each	543 00
30 inch hub end stop valves, geared and with bye pass,	each	345 00
30 inch flange end stop valves, geared and with bye pass,	each	345 00
24 inch hub end stop valves, geared and with bye pass,	each	200 00
24 inch flange end stop valves, geared and with bye pass,	each	200 00
20 inch hub end stop valves	each	110 00
16 inch hub end stop valves	each	70 00
12 inch hub end stop valves	each	39 00
10 inch hub end stop valves	each	30 00
8 inch hub end stop valves	each	23 00
6 inch hub end stop valves	each	13 00
Grey iron castings for stop box frames and covers,	per lb.	0 04
Cutting out and removing to pipe yard: pipes, special castings, breeches pipes and stop valves	per ton	18 00
Steel rolled I beams	per lb.	0 10

Contract No. 20.

DUPLEX PUMPS AND GASOLINE DRIVING ENGINES FOR THE UPPER ROXBOROUGH FILTERS.

————————, Contractor.

For two (2) vertical triplex, double acting piston pumps and two (2) gasoline driving engines, including all pipes, valves and appurtenances, furnished, delivered, erected and completed .....

Contract No. 21.

LOW SERVICE PUMPING STATION FOR UPPER ROXBOROUGH FILTERS.

Henderson & Co., Contractors.

Addition to Roxborough Auxiliary Pumping Station..		$15,997 00
Additional concrete for engine foundations, per cu. yd.		7 50
Additional cut granite masonry for engine foundations	per cu. ft.	3 25

Contract No. 22.

HAND TRAVELING CRANE FOR THE LOW SERVICE PUMPING STATION OF THE UPPER ROXBOROUGH FILTERS.

Alfred Box & Co., Contractors.

Hand traveling crane complete, ready for service....	$2,800 00

Contract No. 24.

FILTERING MATERIALS AND UNDERDRAINS FOR UPPER AND LOWER ROXBOROUGH WATER FILTER PLANTS AND SAND WASHERS FOR LOWER ROXBOROUGH.

Daniel J. McNichol, Contractor.

Filtering materials and underdrains for Lower Roxborough Filters, Nos. 1 and 5, Plan "A," complete		$34,555 00
Filtering materials and underdrains for Lower Roxborough Filters, Nos. 2 and 4, Plan "B," complete		36,248 00
Filtering materials and underdrains for Lower Roxborough Filter, No. 3, Plan "C," complete		17,891 00
Filtering materials and underdrains for Upper Roxborough Filters (all filters), Plan "A," complete..		179,348 00
Filtering materials and underdrains for Upper Roxborough Filters (all filters), Plan "B," complete..		179,249 00
Filtering materials and underdrains for Upper Roxborough Filters (all filters), Plan "C," complete..		179,656 00
Additional No. 1 filter gravel	per cu. yd.	4 60
Additional No. 2 filter gravel	per cu. yd.	4 68
Additional No. 3 filter gravel	per cu. yd.	4 72
Additional No. 4 filter gravel	per cu. yd.	4 80
Additional No. 5 filter gravel	per cu. yd.	4 90
Additional filter sand	per cu. yd.	3 65
Sand washers and buildings for Lower Roxborough filters, complete		10,000 00

Contract No. 25.

WATER FILTER PLANT AT TORRESDALE.

Daniel J. McNichol, Contractor.

Filter Plant, complete		$3,734,000 00
Filtered Water Basin, complete		1,146,000 00
Additional excavation	per cu. yd.	3 00
Additional sodding	per sq. yd.	5 00
Additional granolithic pavement	per sq. yd.	2 50
Additional terra cotta pipe, 12 inches and less,	per lin. ft.	1 50
Additional cast iron water pipe	per ton	40 00
Additional special castings	per ton	70 00
Additional flange pipe and flange special castings,	per ton	110 00
Additional wrought iron or steel	per lb.	0 10
Additional cast iron	per lb.	0 08
Additional embankment	per cu. yd.	1 00
Additional straight curbing	per lin. ft.	2 00
Additional curved curbing	per lin. ft.	2 50
Additional expanded metal	per sq. ft.	0 15
Additional concrete	per cu. yd.	10 00
Additional brick masonry	per cu. yd.	18 00
Additional yellow pine timber	per M. ft. B. M.	60 00
Additional piles	each	10 00

Contract No. 26.

TESTING STATION AT TORRESDALE FILTER PLANT.

Patrick Gormly, Contractor.

Gasoline engine with connections, foundations and other appurtenances, ready for operation	$645 00
Two (2) triplex power pumps, with connections, foundations and other appurtenances	858 00
Pipe lines and connections	6,020 00
Pump house and carpenter work	1,070 00

Contract No. 27.

OAK LANE RESERVOIR.

R. A. Malone & Co., Contractors.

Reservoir, complete		$530,000 00
Additional excavation	per cu. yd.	2 00
Additional embankment	per cu. yd.	0 60

Additional sodding	per sq. yd.	$0 60
Additional wrought iron or steel	per lb.	0 05
Additional cast iron fixtures	per lb.	0 04
Additional concrete	per cu. yd.	8 00
Additional cast iron pipe	per ton	40 00
Additional special castings	per ton	150 00
Additional brick masonry	per cu. yd.	12 00
Additional puddle	per cu. yd.	3 00
Additional asphalt lining	per sq. yd.	3 00