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THE CITY RECORD.

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DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY.

Report for the Year 1903.

New York, December 31, 1903.

Hon. SETH LOW, Mayor:

Sir—In compliance with section 457 of the City Charter, I submit report of the transactions of the Department of Water Supply, Gas and Electricity for the present year.

The operation of the public water supply for the Boroughs of Manhattan and The Bronx, Queens and Richmond is set forth in the accompanying report of Mr. Nicholas S. Hill, Jr., Chief Engineer. Mr. I. M. de Verona, Chief Engineer, covers the same subject for Brooklyn, his report being transmitted as part of the report of Mr. Robert Van Iderstine, the Deputy Commissioner for that Borough. Mr. Charles F. Lacombe, Engineer of Surface Construction, in charge of the Bureau of Lamps and Lighting for the Boroughs of Manhattan and The Bronx, deals with the question of public lights.

The total appropriation from tax levy for the entire Department was, in round numbers, $4,530,000, allowing for transfers, etc. To this should be added the appropriations allowed by the Board of Estimate and Apportionment from the water revenue in Brooklyn for maintenance and distribution of water supply in that Borough, amounting to $1,300,000, making the total funds available, exclusive of bonds, about $5,830,000. During the year bonds to the amount of $4,655,000 were authorized for permanent public improvements. The outstanding water bonds and Corporate Stock amount to approximately $77,000,000, upon which the interest charges for the year are, in round numbers, $2,600,000.

The jurisdiction of the Department includes the inspection of electrical constructions and public lighting, and the expense of administration during 1903 may be classified and divided as follows, the figures being approximate:

Water Supply	$2,618,000 00
Electricity	3,140,000 00
Public Lighting	72,000 00
Total	$5,830,000 00

The total water revenue from the entire Department for the present year is, in round numbers, $9,000,000. The public water system has produced a revenue to the City of $3,782,000 over and above the expenses of administration, maintenance and operation, plus interest charges. To show the net profits, however, there should also be deducted 1 per cent. of the total amount of outstanding water bonds and Corporate Stock ($77,000,000) as a provision for sinking fund, leaving as the net income to the City for the year 1903 $3,012,000.

PUBLIC WATER SUPPLY, BOROUGHS OF MANHATTAN AND THE BRONX.

Croton, Bronx and Byram Systems.

The average total rainfall over the Croton watershed has been 58.73 inches for the year 1903, which is 11. inches higher than the average yearly rainfall for the thirty-five years preceding.

The consumption of Croton water in the Borough of Manhattan has been at an average of 254,000,000 gallons per day, which is 5,000,000 gallons less than the average consumption during the year 1902 and 2,000,000 gallons per day less than in 1901.

Prior to October, 1902, the Borough of The Bronx depended for its entire supply—with the exception of a few hundred thousand gallons a day distributed from a six-inch main crossing High Bridge—upon the pipe line leading from the watersheds of the Byram, Bronx and Wampus, supplemented by water furnished by the City of Yonkers and water furnished by the New York and Westchester Water Company.

About the first of October, 1902, direct connections were completed with the old Aqueduct, and 12,000,000 gallons a day of Croton water were turned into the mains supplying a large portion of The Bronx west of the Bronx river. Lack of complete data and insufficiency of previous records make it impossible to give accurate comparisons, but with the development of new territory it would appear that the average daily consumption in The Bronx has increased 5,000,000 or 6,000,000 gallons since 1902.

More careful computations are now being kept of the watersheds and more accurate measurements of consumption are being taken. Automatic gauges have been ordered and are now being placed in all the principal reservoirs and gate-houses, so that the flow over the Croton Dam and level of water in the reservoirs for each minute of the day can be obtained, and fluctuations in consumption can be followed throughout each hour of the day for the different seasons of the year.

Tests have been conducted to determine the exact flow of water through the Aqueduct and the measurements checked off by pitometer readings on the distributing mains, so that the actual quantity which enters the distribution system can be closely estimated.

Development of Supply.

The only development of supply now in progress is the construction of the Cornell Dam and the resulting enlargement of Croton Lake, under the direction of the Aqueduct Commission.

Surveys have been completed and maps prepared for the construction of a dam and impounding reservoir at Cross river, but the Commission on Additional Water Supply have advised against the building of this reservoir at present.

For a number of years the City has had a well-equipped laboratory at Mt. Prospect, Brooklyn, and the Long Island waters have been subjected to careful and systematic chemical, bacteriological and biological analyses. Such examinations have been extended to the water supply of Manhattan and The Bronx. A branch laboratory is now established at Katonah, Westcheter County, in charge of the Engineer of Sanitary Patrol and under the supervision of an Assistant Bacteriologist from the Mt. Prospect Laboratory. Weekly samples of the water in all the reservoirs and principal lakes in the Croton and Bronx basins are forwarded to this branch laboratory for analysis, and reports are sent to the office of the Chief Engineer, so that he is constantly in touch with the conditions of the supply from the various sources.

Samples are also taken of the water from points of distribution within City limits so that the actual quality of the water as delivered is known and recorded from day to day. The relative hardness of the waters in the several reservoirs and sources of supply has been determined. Special studies have been made of the effect of varying meteorological conditions upon the character of the water supply. The color and turbidity of the water have been studied and noted.

All this data has been carefully checked and diagrams have been prepared showing the daily changes in character and quality of the Croton water as it enters the City—variations in color, turbidity, number of bacteria and the presence or absence of bacillus coli. These diagrams also show the rainfall and the number of typhoid fever cases as reported weekly. The collection and tabulation of such data is the first step toward improving the quality of the supply.

Discoloration of the water as distinguished from turbidity is largely due to vegetable matter in solution, an extract of the leaves, bark, twigs, etc., which accumulate in swampy places. An examination showed that along various streams in the shed deposits of leaves had collected for many years, giving a color and a peaty taste to the water. Much progress has been made during the past twelve months in clearing out bottom lands and removing the underbrush and vegetation for a distance of three hundred feet on each side of the streams and reservoirs where the property is owned by the City. This work has been comprehensive and has covered the greater portion of the watershed. The effect on the water resulting from removing decayed vegetation has already been manifest and has been demonstrated in the laboratory tests.

The laboratory tables show that the color of the water in the East Branch Reservoirs is uniformly high. The East Branch of the Croton river, which feeds this reservoir, passes through a swampy area and surveys have been made for acquiring land on each side of the branch in order that such land may be cleared out and the stream straightened.

The Sanitary Patrol which was organized at the beginning of the year has kept up a constant inspection and carefully guarded the waters throughout the basins of the Croton and Bronx. All nuisances discovered are plotted on maps, and a careful record kept of the steps taken for their abatement.

This work has been carried on in conjunction with the Board of Health, and Dr. Lederle has, among other precautions, arranged with local physicians to report all typhoid cases, and upon receipt of such report a representative of this Department takes the necessary steps for the sanitary protection.

In the abatement of nuisances the Corporation Counsel has been constantly called upon for co-operation and this Department has had the benefit of most prompt legal assistance.

Studies have been made of modern means and methods for the disposal of sewage from the largest towns on the watershed. The electrozone plant which has been in operation for some years at Brewsters has been overhauled and modified and a careful record kept of the effects of this treatment upon the effluent.

Plans have been prepared for intermittent filtration beds at Mt. Kisco, to be operated in conjunction with the sewage system about to be installed by that village.

Maps are nearly completed preparatory to the condemnation of land on East and Middle Branches of the Croton. The commencement of condemnation proceedings will allow the immediate removal of a number of nuisances and sufficient land will be acquired to permit of the construction of filtration beds and other works for the proper disposal of the sewage from the towns along these streams. Two important proceedings for the condemnation of land have been pushed. By one of the proceedings protective strips have been acquired along the Byram, Bronx and Wampus rivers. The Bronx supply is now well protected. St. Joseph's Normal College, which was formerly located adjacent to the Muscoot reservoir, has been vacated, the bodies removed from the cemetery there and the buildings dismantled. The sanitary protection of the City demanded this step.

By the second proceeding a strip approximately 300 feet wide has been taken about Cranberry pond and on each side of its outlet to the junction of the Croton river. The acquisition of this property removes some of the worst nuisances the City has had to contend with.

A number of parcels of land about Lakes Mahopac and Kirk were originally included in the latter proceeding, but subsequently omitted. The property we proposed to take was valuable, and to have continued the policy of acquiring all the riparian land thereabouts would have been very costly. The supply from this source is limited, and careful estimates show that filter beds capable of receiving and filtering the entire flow could be installed and operated at much smaller expense than the interest payments on the Corporate Stock issued to pay for the lands acquired, coupled with the yearly expense of the care of the land, when owned by the City.

Upon the recommendation of the Department the Board of Estimate and Apportionment made an appropriation for the installation of filter beds, and specifications for letting contracts for their construction will be completed within the next four weeks.

Distribution System in Manhattan.

In this Borough the great distributing mains laid through the central thoroughfares are of sufficient capacity to deliver an adequate supply of water from one end of the island to the other. In certain localities, however, the reticulation system needed renewals and enlargements. In side streets, where hotels, apartment houses and other tall structures have recently been erected in place of private dwellings, the old six-inch mains have proved inadequate to deliver the amount of water now required. After a survey of the system as a whole, a careful measure-

ment of hourly flow in the cross mains, the work of renewal and enlargement was taken up, and contracts have been let for laying additional larger mains in many of the streets from Ninth to Fifty-ninth, between Lexington and Seventh avenues.

While the mains have been found to be generally in good condition, so satisfactory a report cannot be made concerning the gate valves and hydrants. The gate valves are not of the modern and efficient design, are in bad repair, and many are broken and completely inoperative. In one district, where an attempt was made to control the flow for the purpose of making a test for waste, twenty-one gates out of sixty could not be closed. Lack of funds has prevented extensive renewals this year; but a design for a modern and efficient gate valve has been adopted. The Chief Engineer urges the installation of new gate valves throughout the entire system.

The condition with regard to hydrants is equally bad. The fire hydrants are of an old type incapable of the service demanded and constantly needing repairs. Twelve hundred hydrants of a modern efficient design have been contracted for during the past year at lower prices than have recently been paid for the old type of hydrants, but all the old type hydrants should be replaced with new and modern ones as soon as possible. This change is most necessary if an efficient fire service is to be maintained.

Distribution—The Bronx.

The development of the distribution system in The Bronx has gone forward during the year. Large mains feeding new sections have been laid or contracted for. General plans have been prepared for a complete system for the Borough, so that the work which is now progressing will be a component part of the ultimate system.

The Chief Engineer submits estimates in his report of new mains which must be laid to take full advantage of distribution from the Jerome Park Reservoir when completed, and also points out very extensive additions that will be needed in that borough before the distribution system is complete. A great area is to be provided for, and the water system will not be able to keep pace with the needs of an increasing population without heavy annual expenditures during coming years. The Jerome Park Pumping Station is nearing completion and should be in operation before the summer months. From this station a much needed supply can be delivered to a territory where the pressure is at present totally insufficient.

Pumping Stations.

While the natural fall from the distributing reservoirs in Central Park is sufficient to deliver a supply to the greater part of the borough, about 20 per cent. of the total consumption must be lifted by pumps to bring the water under proper pressure to buildings in the higher sections.

The high service district extends from Murray Hill through the centre of the Island and along the upper west side. This section has been growing rapidly, and the service has for some time been inadequate. Two additional 15,000,000-gallon pumping engines were contracted for in February, 1901, but owing to delays from strikes and other causes the first of these engines was not completely installed until July of this year, and the second has only been put in operation within the last few weeks. The demands were such that prior to the installation of the first of the new engines all the pumps in use had to be run constantly, and could not be shut down for overhauling and repair. Since that time the necessary repairing has been done, and the stations are now showing marked improvement in efficiency.

The results already attained by better organization, greater watchfulness and the adoption of improved devices are set forth in the report of the Chief Engineer. How thoroughly the whole subject has been studied and how very possible it is to secure increased economy in operation and further saving to the City is brought out in the report of Mr. William J. Sando, Engineer of Pumping Department, Commission on Additional Water Supply.

An adequate supply can now be delivered, and to provide for an increased consumption, which may be expected in the high service district in the near future, contracts and specifications have been prepared ready for advertisement for two additional high duty pumping engines of an aggregate capacity of 25,000,000 gallons per day.

Administration.

Before turning to another subject, I wish to refer to certain administration changes in the Bureau of the Chief Engineer in charge of the Croton, Bronx and Byram systems.

Few additions have been made to the personnel of the staff, but the work has been so subdivided as to place direct responsibility upon the Assistant Engineers in charge of different branches.

Every effort has been made to secure complete and comprehensive records and files so indexed that full information concerning the extent and condition of the system may be quickly available. Maps have been completed of all property owned by the City throughout the watershed. The distribution system has been mapped. Extensions, new connections and changes are plotted on these maps, all of which are indexed and carefully filed. Drawings of uniform size are made of all parts and devices, and as far as possible all articles in general use are standardized.

Pumping station records are kept from which comparative statements can be made. More frequent and exact measurements are taken and data noted from which quantitative and qualitative records are made up for present guidance and future consideration. In other words, the policy has been to get down in black and white whatever may be of interest to the public or of use to those upon whom the responsibility of management may fall.

Borough of Queens.

The deplorable condition of affairs in this borough was commented upon in my report for last year.

The pumping stations were without equipment, the engines and boilers out of repair, dangerous to operate, and in some instances the walls and roofs of the buildings had fallen in. As could be expected from such conditions, what water was delivered was pumped at a cost which made the purchase of a supply at even a high price from a private water company an economy.

During the year radical improvement has been brought about. Buildings have been reconstructed, extensive repairs to machinery made, and new engines and boilers installed or contracted for. The station returns now show that the water is delivered at a greatly reduced cost per million gallons.

The distribution system, particularly in Long Island City, has demanded equal attention and extensive mains have been laid. This portion of the City is developing rapidly and prompt action has been necessary. The greater portion of the supply for Long Island City is obtained from the Citizens' Water Company, with works located in the Town of Flushing. The delivery main leading to Long Island City is not of sufficient capacity to bring the water needed, and a contract has just been let for an additional twenty-inch main. Application has also been made to the Board of Estimate and Apportionment for authority to obtain by condemnation all the plant and property of the Citizens' Water Company. From sources controlled by this company Long Island City must obtain its supply for a number of years. The consumption, moreover, will rapidly increase and cannot be met by the company without extended development of their property. The company will not undertake this development without a contract running for a long term of years.

It is the judgment of the department that the City should acquire this property and develop the supply as needed. Maps have been prepared for the inauguration of condemnation proceedings, and the whole matter was some months ago placed before the Board of Estimate and Apportionment for their consideration.

Borough of Richmond.

The greater portion of the Richmond supply is derived from local water companies. The water is for the most part of poor quality, the rates are high and the service inadequate for needs of the increasing population.

The City operates a small pumping station at Tottenville. Additional mains have been laid during the year from this station, but it can supply but a small section of the borough.

During the year surveys have been completed for a distribution system covering the entire island, with a view to receiving a supply of water from New Jersey as the nearest available source. The maps and plans have been reported on favorably by the President of the Borough, and the matter has been for some time before the Board of Estimate and Apportionment for their consideration.

PUBLIC WATER SUPPLY—BOROUGH OF BROOKLYN.

The average daily consumption for the Borough of Brooklyn was 100,305,485 gallons during the year 1902. During the present year, 1903, it has been 104,747,447 gallons, an increase of about four per cent. The average per capita consumption in 1902 was 82.9 gallons; in 1903 it has been 83.9. Of the total supply the Ridgewood system provided a daily average of about 96,500,000 gallons; Gravesend 2,800,000; New Utrecht 1,300,000, and the New Lots Pumping Station 3,800,000. The total rainfall has averaged upon the Long Island watershed during this year 52.14 inches, or about nine inches above the normal fall. For some years past the rainfall has been above the average and calculations for the future should be based on the probability of recurring dry seasons. We must also anticipate that the demand in Brooklyn will increase in the next few years at a much greater ratio than in any former period. Preparations for meeting such conditions have been pushed during the past twelve months along the lines indicated in the annual report of this Department for the year 1902.

Development of the Water Supply.

Ridgewood System.

The conduit through which most of Brooklyn's supply is brought extends from the Ridgewood Pumping Station easterly about 27.3 miles to Massapequa. This conduit is fed from adjacent surface streams flowing over the southern slope of Long Island and from deep and shallow wells from which the underground water is extracted by suction pumps. The water obtained from the territory between Massapequa and Milburn, which is known as the new watershed, when delivered to the conduit flows by gravity to Milburn. There it is lifted by pumps to a higher level to again enter the conduit and pipe lines and flow on to Ridgewood, the pumping station within the city limits. Between Milburn and Ridgewood a further supply is obtained from intermediary streams and wells.

The development of supply during the year has been in two directions—in securing more of the underground water and in making available, by filtration, certain surface waters which were liable to contamination and dangerous unless purified.

To secure an increased supply of underground water three infiltration galleries are to be constructed. An infiltration gallery consists of a system of pipes laid with open joints beneath the water-bearing stratum and draining into a receiving well, from which well the water is forced or pumped into the conduit. By this method a large proportion of the underground water which would otherwise reach the sea is intercepted. A contract has been let for the first of these infiltration galleries, located at Wantagh, Long Island. Work of construction is already under way and a supply therefrom will be taken next summer. A contract for the building of a second gallery, to be located at Watts Pond, is ready for advertisement. The plans and specifications for the third and most important of these galleries, which will be at Massapequa, are practically completed, and the maps for the condemnation of the necessary lands have for some time been before the Board of Estimate and Apportionment for final adoption.

Additional wells have been driven at the Oconee Pumping Station, which will increase the supply at that point. In making available more of the surface waters I can report the completion of the mechanical filtering plants at Baisleys and Springfield. These plants are now undergoing the final tests. A slow sand filter plant has also been installed at Hempstead for filtering the water of Horse Brook, and a similar plant has been contracted for and is now under construction at Forest Stream for filtering the water from Simonson's stream. From these streams the water cannot be safely used without filtration. The estimated gains may be approximately given as follows:

	Gallons Per Day.
New wells at Oconee Pumping Station, about	1,200,000
Infiltration Gallery at Wantagh	6,000,000— 7,000,000
Infiltration Gallery at Watts Pond	6,000,000— 7,000,000
Infiltration Gallery at Massapequa	10,000,000—12,000,000
Mechanical filter plants at Baisleys and Springfield	7,500,000— 8,000,000
Slow sand filter plants at Hempstead and Simonson's	2,000,000
Total	32,700,000

The average daily supply of the Ridgewood system for the past year has previously been given as 96,500,000 gallons, and the above extensions, consequently, promise an increase of upwards of thirty per cent. A contract has also been entered into between the Queens County Water Company and the City by which that company agrees to deliver from their waterworks near Valley Stream 3,000,000 gallons per day at $30 per million. This contract was entered into not only with a view to securing additional water, but in order to make deep well tests.

The two additional pumping engines which were contracted for in 1902 are now installed at the Milburn Pumping Station ready for operation. These engines will increase the pumping capacity of that station from between 25,000,000 to 30,000,000 gallons per day, making the full station capacity from 80,000,000 to 85,000,000 gallons. The conduit which extends from Rockville Centre to Ridgewood has a safe carrying capacity of about 65,000,000 gallons daily. The conduit from Massapequa to Milburn has the same capacity. Two additional 48-inch pipe lines, however, which extend between Milburn and Ridgewood, make possible a total delivery at that station of 110,000,000 gallons per day. While the daily average of the Ridgewood supply has for the past year been less than one hundred millions, during certain short periods it has gone much above that amount and close to the total possible delivery of the conduit and two pipe lines. Preparations for laying an additional pipe line should be taken up at once.

Pumping Stations Within Borough Limits.

If the plans and specifications already prepared for remodeling the Gravesend Station are carried out, an increase of 500,000 gallons a day may be expected at that point.

At the New Lots Pumping Station (Twenty-sixth Ward), three deep wells have been driven which indicate a further supply from that source of from 1,000,000 to 2,000,000 gallons a day.

Sanitary Protection.

The supply of underground water is filtered by natural process. The filtering plants at Springfield, Baisleys, Hempstead and Simonson's will filter the surface waters on the shed which have been considered in most danger from contamination. During the coming year filter beds should be constructed at Valley Stream, and as rapidly as possible additional filters provided for filtering all the streams from which water is taken throughout that portion of the watershed lying between Rockville Center and the City.

A sanitary patrol has been maintained throughout the year and nuisances carefully guarded against, but with the constantly increasing population it is almost impossible to give complete protection to surface waters from the area referred to without filtration. East of Rockville Center there is a much more sparsely settled country, and the City owns in fee more of the surrounding land. The waters from this portion of the shed can probably be held secure from pollution for many years to come. The work of the laboratory has been well kept up and water analyses have been made at frequent intervals.

Consolidation of Pumping Stations.

A most important problem in the management of the Brooklyn water system is in connection with the operation of the pumping stations. Brooklyn has no gravity supply. All the water must be lifted by pumps to the necessary height to allow proper delivery under suitable pressure. There are twenty-two separate plants, with varying pumping capacity. Ridgewood has engines delivering about 100,000,000 gallons every day in the year. The small stations on the watershed have a capacity of a few million gallons a day and are operated but a few months during the year.

The greatest economy can only be secured in a large plant. Small, isolated plants greatly increase the cost both in fuel and wages. A beginning has been made to secure economy by concentration in the preparation of the plans for remodeling the Gravesend pumping station. When the station is enlarged and remodeled as proposed, the New Utrecht station can be shut down and a larger supply obtained at much less cost than is now had from the two stations together.

The pumping plants for the infiltration galleries previously referred to have been designed with a view to ultimate consolidation and centralized operation.

Through the new force main now being laid, from the Ridgewood pumping station to the Mount Prospect reservoir, a high service supply can be delivered direct from the central plant and the existing high service station at Mount Prospect discontinued, thus securing a very large saving in operation.

Distribution System.

It was stated in the annual report for 1902 that the water mains in the Borough of Brooklyn were not only incapable of distributing an additional supply, but inadequate to deliver the water then available. After a thorough examination, plans were adopted for a comprehensive development and renovation of Brooklyn's distribution system. The work was laid out to extend through a number of years, but so subdivided that the most pressing needs of the borough could be first attended to. The necessity of this improvement was apparent, and during the year appropriations for this purpose amounting to nearly two million dollars have been made by the Board of Estimate and Apportionment. The work is now well under way. A contract has been let for a large 48-inch main leading from the Ridgewood reservoir through Broadway and Park avenue, with branches to the eastern section and the river front. This will bring at least a needed supply to one of the largest manufacturing sections of the City. Contracts have been let for removing and replacing existing mains with mains of greater capacity, particularly in the dry goods district, and contracts are under way for the removal of the small tuberculated mains in every section where complaints have been received from the Fire Department and from the Board of Underwriters demanding greater pressure or larger supply. A contract has been let and work is under way on a 48-inch trunk main from the Ridgewood pumping station to the Mount Prospect reservoir. This main upon its completion will be used for a distributing main, but subsequently will be available as a force main to deliver water direct from the Ridgewood pumping station for high service at Mount Prospect, permitting the discontinuance of a pumping station in the centre of the borough.

I also call special attention to a contract which is now being let for the laying of a 16-inch main from the Mount Prospect reservoir and extending through the centre of the dry goods district to the manufacturing district along the river front. This main has been designed for high pressure and has been laid with such connections as to permit it being fed with salt water from a fire boat or pumping engine at the river front. In all, contracts amounting to $1,813,328.17 have been let during the present year for the laying of new mains and pipes. When the pipes now contracted for are laid the distribution system of Brooklyn will be adequate for the needs of that community.

Water Waste.

The plans for investigating the consumption and waste of water, as set forth in the Department report of 1902, have been followed during this year in Brooklyn, as well as in Manhattan and The Bronx. The close inspection made has resulted in a certain reduction in waste indicated by the reduced consumption in Manhattan. The information compiled from this investigation is fully treated in the reports of the Chief Engineers of the Department and of the Commission on Additional Water Supply. All agree that the present frontage rates are unequal and unfair. It is also the opinion that meters, wherever placed, should be installed and owned by the City and not by private individuals. A bill was presented to the Legislature at its last session, with your approval, providing for City ownership of meters and also providing that their use be extended to all buildings over five stories in height. The bill passed the Assembly, but failed to reach a vote in the Senate. I hope it may be again introduced. Its enactment would give this Department a control over the distribution of the water supply which might, in a critical period, save the City inconvenience, if not actual damage and suffering.

COMMISSION ON ADDITIONAL WATER SUPPLY.

The report of the Commission on Additional Water Supply was completed on November 30. In transmitting it to the Board of Estimate and Apportionment, you commented upon its scope and called attention to special features contained in it.

This report gives the results of practically a year's work by the Commission, and is a substantial part of the record of the Department of Water Supply, Gas and Electricity for the year 1903. It deals with present water supply as well as a supply for the future, and discusses many of the operations of this Department for the current year.

Much of the work described was carried on with the direct co-operation and assistance of the Engineers on the permanent Department staff. The water waste investigations were conducted by the Chief Engineers for Manhattan and Brooklyn, and Dr. George C. Whipple, the Bacteriologist for the Department, was in charge of the Commission's Chemical and Biological Division. On the other hand, the members of the Commission have been constantly consulted on matters of local and immediate operation.

The report is comprehensive and thorough and represents the exhaustive preliminary investigations required before the City could be in the position to take intelligent action toward securing an additional supply of water. With the data collected and presented action can be now taken.

I need not emphasize the fact that we are approaching dangerously near to the limit of our present supply, and that work of construction by which an additional supply can be obtained should be inaugurated without delay.

I attach to this report a copy of the letter of the Mayor to the Board of Estimate and Apportionment, dated December 18, 1903, transmitting the report of the Commission.

"I."

WATER REVENUE.

In Manhattan and The Bronx, the cash collections for the two boroughs during 1903 were $5,623,888.71, as against $5,592,894.96 for 1902, and $4,710,654.33 for 1901. The Commissioners of Accounts in a report to the Mayor, under date of December 15, 1903, entitled

"Audit of the Receipts of the Bureau of Water Register, Department of Water Supply, Gas and Electricity, Borough of Manhattan, for the fiscal year ending April 30, 1903," state:

"Previous examinations of this Bureau have included the operations of both the Boroughs of Manhattan and The Bronx, but on May 1, 1902, a separate office was established in The Bronx to take charge of the water business of that Borough, and an examination of its financial affairs is now in progress.

"For this reason an exact comparison of the business for the year under review with the one next preceding it cannot be made at this time, but it is of much interest to know that the receipts for the last year were much greater than those of the former.

"Receipts, Manhattan alone, year ending April 30, 1903	$5,044,890 51
"Receipts, Manhattan and The Bronx, year ending April 30, 1902	4,883,644 86
	$161,145 65

"The receipts from this source in the Borough of The Bronx were close to $450,000.00, so that when the totals are combined for the purposes of an exact comparison, it will be seen that more than $600,000.00 were collected in the latter year, or more than 12½ per cent. increase on the collections of the former year; from this certain inferences may be drawn which cannot be discreditable to the present management."

Increased efficiency in the force is shown by the fact that the aggregate returns of unpaid charges to the Bureau of Arrears were only $312,919.55. The following table shows the returns for each borough for 1901, 1902, and 1903:

Borough.	1901.	1902.	1903.
Manhattan and The Bronx	$594,329 86	$448,382 20	$312,919 55
Brooklyn	214,538 76	229,103 35	158,644 84
Queens	.....	14,994 24	10,613 61
Richmond	.....	.....	.....
Total	$808,868 62	$692,479 79	$482,178 00

It is to be noted that the amounts returned during 1903 as unpaid, were the unpaid charges of the preceding "water year," ending April 30, 1903. (Section 1022 of the Charter).

The Commissioners of Accounts, in their report of December 15, 1903, call particular attention to the method of keeping the meter ledgers, saying:

"In a former report of this Bureau, under date of November 3, 1902, covering the fiscal year 1901-1902, we called attention to the unsatisfactory manner in which many of the accounts on the meter ledgers were kept, and cited a number of cases where bills had not been rendered for more than a year, or entries made on the ledgers, although the Inspectors' index books showed frequent reading of the meters, and in all cases a very considerable consumption of water. An examination of the ledgers at this date shows that all the cases called to the notice of the Bureau have received attention, and bills have been rendered and paid, but the old system still prevails, and the books show great and unwarranted irregularities in the rendering of bills. * * * * * * * *

"This examination of the meter ledgers also included the verification of the entries from the index books and the correctness of the bills rendered. It was not intended to cover all the work in this branch of the business, but rather as a test of the accuracy and condition of the ledgers; therefore it must be understood that the examination was only partial in its scope, but comparatively few of the ledgers being subjected to our scrutiny. We found, however, sufficient proof of carelessness and inaccuracy to warrant us in the opinion that a more rigid supervision of these accounts is imperative, and we recommend that the Water Register, who has charge of this Bureau, assign some competent Clerk to the duty of checking and verifying each entry on the ledgers upon which a bill is based, and especially so in the case where a bill is rendered upon an estimated average consumption, and that said Clerk be held to a strict accountability for the correctness of all bills."

The Water Register's Bureau in Manhattan was reorganized in the summer of 1903, younger and more active men being placed in charge of the branches having control of meters and meter accounts, and many of the matters commented upon by the Commissioners of Accounts have been corrected. The books of the charges for the public water service are kept on the single entry system and show cash receipts. This system of bookkeeping dates back almost to the introduction of the Croton water, and needs thorough and exhaustive study and consideration by the best experts. Otherwise irregularities can be lessened by increased watchfulness, but not entirely corrected.

During the year 1,209 new meters were set in the Borough of Manhattan, of which 214 were set by the City plumbers.

LAMPS AND LIGHTING.

The cost of lighting the streets, public places and public buildings forms a material portion of the whole amount which must be yearly raised by taxation. The total appropriation for 1903 for all public lighting, including the schools, amounted to $3,306,346.23. The appropriation for 1903 was between 28 and 29 per cent. more than the appropriation for 1898, but the increases have never kept pace with the City's growth, and the City through most of its area is to-day inadequately lighted. The central avenues of Manhattan Island are well illuminated, but in most of the streets the darkness is but slightly dispelled by small open flame gas burners, a means of illumination which was the best available forty years ago, but which now falls far below present standards and demands. And the poorly lit streets are the very ones where full illumination is necessary to public safety and the protection of life and property. In the Boroughs of Brooklyn, Queens, Richmond and The Bronx there are many more badly lighted streets and there are many streets in newly developed sections which have no lights at all. The spreading of the population over new territory—a tendency which will be largely augmented by the completion of bridges and transit facilities now in course of construction—will greatly extend the lighting area of the City.

Contracts for City lighting are let from year to year, and the contracts for lighting for the year 1902 had been advertised for and the proposals accepted in December, 1901. During the year 1902 some few extensions of lights were made, but in most cases reasonable requests for more lights had to be met with the explanation that there were no funds for the purpose.

Proposals were prepared and advertised for public lighting for the year 1903 as required by section 530 of the Charter. Before the specifications were drafted a conference was held with the representatives of the leading lighting companies, and they were asked if they had any suggestions to make as to the changes in the specifications and their attention was called to the fact that unless the prices were in some way reduced the City would not be able to secure additional lights which were most urgently required. Upon the opening of the bids the beginning of last January, it was found that the proposals practically contained the same prices as those of the year before. An examination of the records showed that most of the prices named had been the same for ten years, many for twenty and some for a longer period. There was no competition whatever between rival bidders. The lighting interests in the City had all practically united, and even in those boroughs where there had been no formal consolidation the territory was apportioned. As competition was without the range of legal possibility it did not seem to me that as Commissioner I was justified in accepting the bids received merely because the forms of law had been complied with and legal advertisements for proposals inserted in the newspapers.

On March 12, 1903, I transmitted to the Board of Estimate and Apportionment a summary of the bids submitted for the current year, with corresponding prices for the year 1902, and also forwarded a report prepared by Mr. Charles F. Lacombe, Engineer of Surface Construction, which report contained a statement of prices paid in other cities for gas and electric lighting, with charts clearly indicating the comparative cost. I also stated to the Board of Estimate and Apportionment that I was unwilling to execute the contracts upon the bids received, and recommended that all bids be rejected. As there could be no competition in bidding I suggested that section 530 of the Charter be so amended that the Commissioner of Water Supply, Gas and Electricity be allowed to make contracts for lighting without public bidding, and for a longer term than one year when authorized by the Board of Estimate and Apportionment. I also recommended that application be made to the Legislature to empower the City to establish and maintain a municipal electric lighting plant for public purposes. The Board of Estimate and Apportionment took immediate and unanimous action.

A bill was introduced into the Legislature amending section 530 of the Charter on the lines proposed, but the proposed amendment received little or no consideration. A bill was also prepared by the Corporation Counsel and introduced by Mr. Elsberg in the Senate and Mr. Finch in the Assembly, empowering the City to erect and maintain a municipal electric lighting plant for public purposes. This bill, besides having the support of the Board of Estimate and Apportionment, was unanimously approved by the Board of Aldermen and its passage advocated by a large number of independent bodies of citizens. The Consolidated Gas Company, however, appeared in opposition to the bill and it was defeated during the closing days of the session—Senators Martin and McCarren strongly opposing its passage.

After the adjournment of the Legislature, favorable action for the relief of the City having been refused, I again communicated with the Board of Estimate and Apportionment and again recommended that all bids for public lighting for the current year be rejected. The question of rejecting the bids, together with other matters in which the lighting companies were interested and requiring adjustment with the City, was referred to a special committee consisting of the Mayor, the Comptroller and the President of the Board of Aldermen. This committee reported on

December 4, 1903, that in their opinion all bids should be rejected except the bid of the New Amsterdam Gas Company for $12 per lamp per year, and saying in part:

"We are firmly of the opinion that a City official is not justified in accepting a bid merely because the statutory requirements as to public advertisement have been complied with. The theory that the lowest competitive bid affords a practical test of what is a fair and reasonable price falls to the ground when there is no real competition. When a fair price for an article cannot be reached or even indicated by actual competition the sum the City is to pay should be settled after investigation into the cost, production and delivery of the commodity supplied. Under section 149 of the Greater New York Charter the Comptroller has power to settle and adjust all claims against the City, and through his ability to subpoena witnesses and to compel them to testify under oath he has ample facilities for testing the correctness of any claim which may be filed with him. The companies which have provided public lighting during the current year should file their claims with the Comptroller. Any company feeling aggrieved by his decision can doubtless recover by suit what it may be reasonably entitled to receive. * * * We again urge the recommendation made to the Legislature last March that section 530 of the Charter be so amended that the Commissioner of Water Supply, Gas and Electricity may make lighting contracts without public letting for a term not exceeding five years, when authorized by the Board of Estimate and Apportionment so to do, and also that a bill be passed empowering the City to establish and maintain an electric lighting plant for public purposes."

As matters now stand all bids for public lighting, except the bid of the New Amsterdam Gas Light Company, have been rejected and the settlement of claims is in the hands of the Comptroller. Proposals for public lighting for the year 1904 have not been advertised. If the firm stand taken by the City authorities is maintained, the lighting conditions throughout the City can be vastly improved. The gas companies may be depended upon to co-operate in an extensive substitution of mantle lights for the old open-flame burners. Within the past three months the Consolidated Gas Company has substituted 500 mantle lights without charge to the end of the year, above the cost of the open lamps replaced. I desire to express to the company the thanks of the Department for this action. An earnest effort should be made on both sides to permanently do away with the wasteful, antequated and inefficient open gas burners for street lighting.

If the State Legislature will come to the relief of the City, the whole problem will be simplified. A few years ago the City of Baltimore paid for electric lighting $127.75 for a 2,000-candle power lamp per year, a price much lower than that charged for electric lighting in Manhattan and The Bronx. A bill was passed by the Maryland Legislature authorizing the City of Baltimore to provide funds for the erection of a municipal lighting plant, and the same company now lights Baltimore, but the charge per annum for a 2,000-candle power lamp is $99.92. New Orleans has benefited by a like reduction under very similar circumstances . But without the assistance of the Legislature, The City of New York is not absolutely helpless. The suit instituted by the Corporation Counsel against the Consolidated Telegraph and Electrical Subway Company will develop facts by which the electrical subways themselves may be acquired by the City, and an examination by the Corporation Counsel shows that the gas companies occupying the streets within the city are exercising limited and restricted rights.

The report of Mr. Charles F. Lacombe, the Engineer of Surface Construction, gives in detail the conditions of public lighting in the boroughs of Manhattan and The Bronx. Mr. Lacombe submits much comparative data from other cities. He compares New York prices with those elsewhere, and also tells what prices the City has paid in past years. In addition, his report sets forth clearly the results accomplished in his Bureau during the past year. In spite of the confusion due to the fact that no contracts were in existence, lights have been extended and various improvements have been brought about. He has studied in detail the administration of his Bureau, and has been able to effect many economies. I refer with keen satisfaction to this report and the year's record of this Bureau.

THE ELECTRICAL BUREAUS.

The two most important electrical bureaus are located in Manhattan and Brooklyn, and are under separate bureau chiefs. In Queens and Richmond there are electrical inspectors who report to the Deputy Commissioners for those boroughs.

The electrical jurisdiction of the Department covers, generally speaking, the inspection of interior and exterior electrical wiring and construction in cases where applications are made for the certificate of the Department's approval, and the issuance of permits, approved by the Borough President, to open the streets for the purpose of laying electrical conductors underground or erecting them overhead. The details of this work will be found in the Quarterly Report of this Department. The demands upon the working force are continually increasing on account of the rapid growth and extension of electrical enterprises.

The important electrical problems confronting the Department have been under the supervision of George F. Sever, Consulting Electrical Engineer, whose report is hereto annexed and marked "Document VIII."

The removal of overhead wires in the congested business streets of Brooklyn has progressed satisfactorily, except as to the wires of the Police and Fire Departments. Sufficient funds should be provided without delay for the burial of the latter. The preliminary work for the removal of the great west side telephone pole line from Cortlandt street to One Hundred and Forty-fifth street has been practically concluded, and the actual removal of the poles and wires will soon commence. It is difficult to appreciate the extent of this undertaking, involving as it did the discovery and successsful application of an entirely new method of transmitting long-distance telephone currents.

A satisfactory start in the electrolysis investigation has been made in Brooklyn by a well-equipped and well-organized force.

Important work has been done in the direction of remodeling the rules and regulations for electrical work.

Electrical work has been done for other departments with satisfactory results.

Preliminary surveys have been made looking to the burial of overhead wires in certain sections of The Bronx.

In addition to the matters above referred to, this Department has under its charge the direction and supervision of the construction in the Boroughs of Manhattan and The Bronx of the underground subways for electrical conductors, by the Consolidated Telegraph and Electrical Subway Company and the Empire City Subway Company. The Mayor, Comptroller and President of the Board of Aldermen, in their report to the Board of Estimate and Apportionment, dated December 4, 1903, a copy of which is hereto annexed and marked "Document VI.," state as follows:

"Our examination has, moreover, led us to inquire into the accounts of the Consolidated Telegraph and Electrical Subway Company. In Manhattan the electric light wires are practically all under ground, and this fact is given as justifying the very high charge for electric lights in this Borough. The subways for these wires are owned almost entirely by the Consolidated Telegraph and Electrical Subway Company, but this company is owned by the New York Edison Company, which, in turn, is owned by the Consolidated Gas Company, and the subway rights thus secured are the basis of the latter company's monopoly in the distribution and sale of electric current on Manhattan Island. The agreement of 1886 and 1887, under which the subways were constructed, provide for equal rights in the subways for all electric lighting companies, but to-day the attempt of an independent company, not controlled by the Consolidated Gas Company, to extend its conductors already laid in the streets is being contested, though the City authorities have recognized the validity of the company's franchise, and have issued a permit to it to place its conductors underground.

Those agreements of 1886 and 1887 also provide that the City shall receive from the Consolidated Telegraph and Electrical Subway Company each year all of its profits over ten per cent. of the actual cost of construction and operation, and the City is allowed to buy the subways on paying the actual cost, plus ten per cent. Nothing has ever been paid to the City under these agreements, the company claiming that it has never earned more than ten per cent. of the actual cost of construction.

In January of this year the Treasurer of the Consolidated Telegraph and Electrical Subway Company filed a sworn statement with the Comptroller to the effect that the cost of construction of electric light and power subways to January 1, 1903, amounted to $7,492,200.62. The Commissioners of Accounts, after an examination of the books of the company in September last, reported that the amount given by the Treasurer of the company is over $3,000,000 above the true cost, and if we may draw any deductions from data received as to the cost of similar construction in other cities, the correctness of the figures given by the Commissioners of Accounts are still too high. The City has brought an action for an accounting to determine the exact amount due under the contracts above referred to."

As stated above under the heading "Public Lighting," it is most important that this suit should be pressed, and that the City should, by acquiring the electrical subways, put itself in a position adequately to control and safeguard the service of electric current.

Arrangements have been made through the Board of City Record to print (and thus place in permanent form) the minutes of the Board of Commissioners of Electrical Subways and of the Board of Electrical Control. Those Boards were the agents of the City in making the contracts with the subway companies, and those minutes are valuable as containing the record of property rights of many existing public service corporations.

The following documents are attached to this report:

"I." Comparative statement of collections for the account of the public water service, classified as to sources, for each borough, showing revenue, returns, etc., with increases and decreases for years 1902 and 1903.

"Ia." Statement showing titles of appropriations and expenditures for year ending December 31, 1903, also Special and Trust Accounts, etc.

"II." Report of Nicholas S. Hill, Jr., Esq., Chief Engineer of Water Supply for Manhattan, The Bronx, Queens and Richmond.

"III." Report of Robert Van Iderstine, Deputy Commissioner for Brooklyn.

"IV." Report of Charles F. Lacombe, Engineer of Surface Construction, as to lighting in Manhattan and The Bronx.

"V." Report on Municipal Lighting to the Board of Estimate and Apportionment, March, 1903.

"VI." Report of the Committee of the Board of Estimate and Apportionment to that Board, December 4, 1903, as to public lighting.

"VII." Reports of the Commissioners of Accounts as to the Consolidated Telegraph and Electrical Subway Company and the Empire City Subway Company.

"VIII." Report of George F. Sever, Consulting Electrical Engineer.

"IX." Letter of the Mayor to the Board of Estimate and Apportionment, dated December 18, 1903, transmitting report of Commission on Additional Water Supply.

"X." Report of Frank E. Brown, Chief Inspector.

"XI." Report of Gustav A. Roullier, Deputy Commissioner for Queens.

"XII." Reports of George S. Scofield, Deputy Commissioner for Richmond.

Respectfully,
ROBERT GRIER MONROE,
Commissioner of Water Supply, Gas and Electricity.

DOCUMENT I.

Revenue from the Water Service.

The following comparative statement shows in detail all collections for revenue made by the several boroughs for the years 1902 and 1903; also collections for account of Meter Setting Fund No. 2, section 188 of the Charter; also the returns made to the several Receivers of Taxes:

DOCUMENT I.

Comparative Statement for 1902 and 1903 of Revenue, Returns, etc., from Water Service, The City of New York.

	Manhattan.		The Bronx.		Brooklyn.		Queens.		Richmond.		Total.	
	1902.	1903.	1902.	1903.	1902.	1903.	1902.	1903.	1902.	1903.	1902.	1903.
Regular Annual Frontage Rates.....	$2,028,345 75	$1,942,194 67	$265,789 75	$306,870 30	$1,656,652 28	$1,548,901 09	$75,812 00	$105,568 36	.....	.....	$4,026,599 78	$3,903,534 42
Penalties, section 476, Charter....	32,290 01	27,945 48	4,499 59	6,959 93	30,208 81	20,916 48	72 39	1,313 14	.....	.....	67,070 80	57,135 03
Meter Charges—												
Buildings	2,842,664 27	2,931,106 14	138,267 13	167,011 01	703,211 27	871,181 24	97,430 40	92,493 56	†$3,830 65	†$4,585 07	3,785,403 72	4,066,377 02
Steamboats	151,663 55	138,136 70	.....	.....	.....	.....	999 33	582 85	.....	.....	152,662 88	138,919 55
Total.....	$5,054,963 58	$5,039,382 99	$408,556 47	$480,841 24	$2,390,072 36	$2,440,998 81	$174,314 12	$199,957 91	$3,830 65	$4,585 07	$8,031,737 18	$8,165,766 02

	Manhattan. 1902.	Manhattan. 1903.	The Bronx. 1902.	The Bronx. 1903.	Brooklyn. 1902.	Brooklyn. 1903.	Queens. 1902.	Queens. 1903.	Richmond. 1902.	Richmond. 1903.	Total. 1902.	Total. 1903.
Permits—												
Taps	8,351 10	5,656 00	2,348 00	3,687 00	10,271 75	13,217 25	1,853 00	2,044 75	.....	.....	22,823 85	24,605 00
Building Purposes, Extras, Boilers, etc.; Tugs, Street Sprinkling; Miscellaneous, Repairs, Labor and Materials	111,134 09	76,135 96	7,541 72	10,184 99	18,008 77	23,487 75	1,448 05	1,501 94	.....	.....	138,132 63	111,310 64
Total Revenue, 1902	$5,174,448 77	.....	$418,446 19	.....	$2,418,352 88	.....	$177,615 17	.....	$3,830 65	.....	$8,192,693 66	.....
Total Revenue, 1903	.....	$5,121,174 95	.....	$494,713 23	.....	$2,477,703 81	.....	$203,504 60	.....	$4,585 07	.....	$8,301,681 66
Increase Revenue, 1903	.....	.....	*76,267 04	.....	59,350 93	.....	25,889 43	.....	754 42	.....	$162,261 82	.....
Decrease Revenue, 1903	.....	*53,273 82	.....	.....	.....	.....	.....	.....	.....	.....	.....	$53,273 82
Net Increase Revenue, 1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$108,988 00
Memo.—Meter Setting Fund No. 2, section 188, Charter	Nil	$6,623 53	Nil	$1,275 68	Nil	Nil	Nil	Nil	Nil	Nil	Nil	$7,899 21
Arrears for 1902 Water Rates, etc., Returned to Receivers of Taxes, section 1022, Charter	$385,915 06	258,710 95	$62,467 14	54,208 60	$229,103 35	$158,644 84	$14,944 24	$10,613 61	Nil	Nil	$692,479 79	$482,178 00
Decrease Returns, 1903	.....	127,204 11	.....	8,258 54	.....	70,458 51	.....	4,380 63	.....	.....	.....	210,301 79
	$385,915 06	$385,915 06	$62,467 14	$62,467 14	$229,103 35	$229,103 35	$14,944 24	$14,944 24	.....	.....	$692,479 79	$692,479 79

‡Collections from all sources.
*Collections for The Bronx were made by Manhattan Office from January 1 to April 30, 1902. For the same period in 1903 The Bronx Office collected $52,261.77.
NOTE—Collections reported by Receivers of Taxes and Collectors of Assessments and Arrears of Water Arrears not included in above.

RECAPITULATION.

	1902.	1903.	1903, Increase.	1903, Decrease.
Total Water Rates Collected	$8,031,737 18	$8,165,766 02	$134,028 84	.....
Total Miscellaneous, Permits, etc., Collected	160,956 48	135,915 64	.....	$25,040 84
Total Revenue	$8,192,693 66	$8,301,681 66	$108,988 00	.....
Meter Setting Fund No. 2	Nil	7,899 21	7,899 21	.....
Total Collections	$8,192,693 66	$8,309,580 87	$116,887 21	.....
Returns to Receiver of Taxes	692,479 79	482,178 00	.....	210,301 79
Total	$8,885,173 45	$8,791,758 87	.....	.....
Net Decrease, 1903	.....	93,414 58	93,414 58	.....
	$8,885,173 45	$8,885,173 45	$210,301 79	$210,301 79

DOCUMENT Ia.

Summarized statements showing titles of appropriations, appropriations with transfers, for 1900, 1901, 1902 and 1903, and total payments for expenditures during 1903, for boroughs of Manhattan, The Bronx, Queens and Richmond are herewith appended.

Summary of Expenditures for the Year ending December 31, 1903—Boroughs of Manhattan and The Bronx.

Appropriation Account.	Appropriations of 1900.	Appropriations of 1901.	Appropriations of 1902.	Appropriations of 1903.	Total Payments in 1903.
Additional Fire Hydrants	.....	.....	$775 92	.....	$775 92
Aqueduct Repairs and Maintenance	$359 61	.....	.....	.....	359 61
Bronx Park Works, Maintenance and Repairs	.....	.....	1,818 03	$18,266 19	20,084 22
Bronx River Works, Salaries	.....	.....	.....	3,900 00	3,900 00
Bureau of Chief Engineers, Salaries	.....	.....	.....	15,563 04	15,563 04
Croton Water System, Maintenance	.....	$1,127 77	67,038 46	262,646 77	330,813 00
Croton Water System, Salaries	.....	.....	.....	30,994 30	30,994 30
Laying Croton Pipes	1,600 70	5,622 94	.....	.....	7,223 64
Public Drinking Hydrants	.....	.....	124 40	1,663 16	1,787 56
Repairing and Renewal of Pipes, etc.	.....	3,887 96	25,012 27	226,400 17	255,300 40
Supplies and Contingencies	.....	.....	1,584 62	2,429 81	4,014 43
Water Supply for the Twenty-fourth Ward	.....	.....	1,048 18	13,160 63	14,208 81
	$1,960 31	$10,638 67	$97,401 88	$575,024 07	$685,024 93
Revenue Bond Account.					
Purchase of the Property, Franchises, etc., New York and Westchester Water Company	.....	.....	.....	660,501 74	660,501 74
					$1,345,526 67
Revenue Bonds Fund for operating New York and Westchester Water Company Plant	.....	.....	.....	.....	33,575 49
Additional Water Fund	.....	.....	.....	.....	246,086 27
Water Fund, Manhattan and The Bronx	.....	.....	.....	.....	765,584 88
Water Main Fund No. 3	.....	.....	.....	.....	160,670 25
Total	.....	.....	.....	.....	$2,551,443 56

Summary of Expenditures for the Year ending December 31, 1903—Borough of Queens.

Appropriation Account.	Appropriations of 1901.	Appropriations of 1902.	Appropriations of 1903.	Total Payments in 1903.
Maintenance and Repairs of Water Pipes	.....	$3,237 44	$22,687 88	$25,925 32
Pumping Stations—Fuel and Supplies	$26 33	23,559 80	20,465 20	44,051 33
Rental of Fire Hydrants	.....	19,337 99	23,250 88	42,588 87
Salaries—Office of Deputy Commissioner	.....	.....	21,130 00	21,130 00
Salaries—Pumping Stations	.....	.....	33,525 85	33,525 85
Supplies and Contingencies	.....	2,286 70	1,805 27	4,091 97
Supplying Water to Long Island City	.....	8,226 62	89,262 82	97,489 44
	$26 33	$56,648 55	$212,127 90	$268,802 78
Revenue Bond Account.				
Revenue Bond Fund for Laying Water Mains in Borough of Queens	.....	.....	.....	33,601 27
Water Fund—Borough of Queens	.....	.....	.....	110,797 25
Total				$413,201 30

Summary of Expenditures for the Year ending December 31, 1903—Borough of Richmond.

Appropriation Account.	Appropriations of 1902.	Appropriations of 1903.	Total Payments in 1903.
Pumping Station Salaries and Supplies	$1,466 49	$7,021 26	$8,487 75
Rental of Fire Hydrants	22,270 80	14,230 00	36,500 80
Salaries—Office of Deputy Commissioner	.....	6,199 88	6,199 88
Supplies and Contingencies	342 39	1,462 47	1,804 86
	$24,079 68	$28,913 61	$52,993 29
Revenue Bond Account.			
Revenue Bond Fund for Laying Water Mains in Tottenville	.....	.....	272 17
Water Fund, Borough of Richmond	.....	.....	8,982 23
Total	.....	.....	$62,247 69

"II."

Hon. ROBERT GRIER MONROE, Commissioner of Water Supply, Gas and Electricity, Park Row Building, New York City:

Dear Sir—I beg respectfully to submit my report for the work performed by the Bureau of Chief Engineer of Water Supply for the year ending December 31, 1903.

(A) MANHATTAN AND THE BRONX, QUEENS AND RICHMOND.

(1) Engineering Division.

The Engineering Division is in charge of the Chief Engineer. This Division includes the draughting-room and such assistants to the Chief Engineer as he may select. These assistants have special duties assigned to them and form, in reality, together with the Chief Draughtsman in charge of the drawing-room, the technical staff of the Bureau. The assistants to the Chief Engineer are designated to make special investigations and researches, to prepare estimates and plans which are subsequently executed in the draughting-room, and from time to time have special powers delegated to them for the purpose of bringing the plant in its entirety up to the highest efficiency. The Chief Draughtsman has charge of the drawing-room, together with the preparation of all plans for new work of every kind, except where otherwise deemed advisable.

Upon assuming the duties of the office of Chief Engineer of this Bureau, I found the drawing-room in an exceedingly unsatisfactory condition. There were very few records or drawings of important works on file and no adequate system of indexing such as were to be found was maintained. The force was entirely inadequate to make plans for needed repairs to the pumping stations, machinery and plant, which were necessary, in many instances, to put it in a safe condition for operation. It is fair to assume that the organization of this important adjunct of the Bureau had never been in good condition, but in the beginning of the autumn of 1902 it was practically in a state of disintegration. The drawing-room has been entirely re-

arranged and modern filing cabinets and drawing tables procured. At my request the Civil Service Commission held special examinations for the purpose of obtaining men technically educated in the special lines which the requirements of the draughting-room demanded. A complete system of card indexing all drawings has been established, together with a uniform system of filing the drawings and numbering the same. Standard sizes for all drawings have also been adopted. A card index system of filing and numbering all applications has also been placed in use, standard specifications for materials prepared and numerous other improvements made, the enumeration of which could not be permitted in this report. For details, reference is made to Appendix, showing a report of the Chief Draughtsman.

As soon as it was possible to effect the necessary reorganization of the draughting room, which occupied considerable time, owing to the delays in obtaining the necessary examinations from the Civil Service Commission, work was immediately commenced on the portions of the plant which needed most active attention. It may be said here that the pumping plants in the Borough of Queens were first taken up, on account of their deplorable physical condition. I append herewith report of Mr. Thomas Gannon, the Chief Draughtsman, giving a list of the contracts and specifications which have been let during the year, as well as those which are ready for advertisement or in the hands of the printers. It will be seen that there have been let or prepared during the year 78 contracts, the aggregate value of which will equal $2,200,000. By reference to the report of the Chief Draughtsman an idea can be obtained of the amount of detail entered into and the completeness of the rehabilitation of the pumping stations in Queens. As the plants in this borough were taken care of first, the plans for improving the pumping stations in Manhattan were necessarily delayed, but at the present time plans and specifications are completed which will materially improve the conditions of the pumping stations at Ninety-eighth street and One Hundred and Seventy-ninth street, Manhattan, and reduce the cost of operation. The general nature of the repairs at the various pumping stations will be taken up in a chapter of this report devoted to the Mechanical Division, and the matter of the changes designed with relation to the distribution system and the extension of mains will be treated in a chapter devoted to the division in charge of mains and distribution. I might add that several contracts were prepared in the last three months of 1902 which had direct bearing on the work during the year 1903.

(2) Mechanical Division.

In the reorganization of this Bureau the Mechanical Division was inaugurated, and Mr. John W. McKay, Assistant Engineer, put in charge. In this division is included all the pumping stations in the boroughs of Manhattan, The Bronx, Queens and Richmond. The Chief Enginemen at the stations all report to Mr. McKay. He signs all requisitions for new material for his division, and certifies in writing on the face of all bills or estimates as to the proper receipt of the goods or work done; he sees that the proper storerooms are maintained for the care of materials, provides the necessary stock accounts, and supervises all work done at the stations, by contract or otherwise, and he is responsible for the safe, economical and efficient operation of all of the stations.

Formerly the pumping stations in the Borough of Queens were under the care of an Assistant Engineer, styled "Assistant Engineer in charge of the Borough of Queens," who also had charge of the distribution system. This man had no special knowledge of pumping engines or pumping station machinery, with the result that the stations did not receive proper attention. Mr. McKay has an assistant who acts as Chief Engineman in charge of all of the Queens stations, and more particularly of the construction work which has been necessary to put them in proper repair.

Upon examination of the stations in Manhattan it was early discovered that there was necessity for a large amount of repair work in order to put the stations on an economical basis and in a condition which would compare favorably with stations in other cities at which similar types of engines were operated. This statement applies with equal force to the stations in Queens, except that in Queens the conditions were aggravated. In fact, in this borough several plants were in such condition as to render them unsafe, without regard to the extravagant cost of operation, owing to the wastefulness and poor economy of the machinery.

Shortly after I undertook the duties of Chief Engineer of this Bureau, the boilers in the No. 2 Station in Long Island City exploded, killing two men. It was also found that the boilers in Stations Nos. 2 and 3 in Long Island City were being worked at a pressure too high for the thickness of the plate in the boiler shell, which was much corroded. Thereafter the pressure was reduced from 10 to 20 pounds, in order to preclude all possibility of a repetition of the fatal accident at the No. 2 Station. This illustrates the conditions which were found in these plants, as will be seen from the attached Appendices, reports of the Assistant Engineer in Charge of the Mechanical Division, and the Chief Draughtsman. Nearly every part of these stations has been rebuilt and remodeled, including the buildings. The pumps which were available for use have been thoroughly overhauled and repaired, and new pumps have been ordered where necessary; new boilers have been placed at all of the stations; new stacks where required; buildings have been repainted and resashed throughout; additions and extensions to the buildings made when necessary; new steam piping and feed water heating apparatus contracted for; additional wells driven or contracted for to extend the supply, which is entirely inadequate at the present time to meet the ordinary demand of Long Island City and afford the necessary fire protection. A transformation in the appearance of these stations has been made during this past year, and Mr. McKay and Mr. Drew, his assistant in this borough, deserve much credit for the progress which has been made.

To return to Manhattan: Repairs had not been regularly made at the stations in this borough, and there was a great lack of organization at these plants. While the force engaged was amply large to keep the stations in almost perfect order, the men were not required to do very much and exerted themselves less. The plan of the stations, that is to say, the relative locations of the boilers and engines, steam piping, etc., is not calculated to derive the maximum results from the machinery installed. The boilers are at quite a distance from the engines, causing long lines of steam piping, with resulting excessive condensation. The boilers in some cases are quite old. At the Ninety-eighth street pumping station two of the engines are out of date. There is some excuse for the poor condition of the machinery in the stations of Manhattan, the former Chief Engineer having made requisition as far back as 1899 for funds to provide for two fifteen-million gallon engines, which have just been completed. The matter was delayed for several years, and finally contracts were let in 1891 to Henry R. Worthington. This concern, through strikes, insufficient facilities and the enormous demand for pumping machinery which has existed during the past few years, delayed the delivery of the engines from time to time until this company is about two years behind the time of completion guaranteed. If the Department had gotten this engine at the early date requested there would have been opportunity to make repairs which could not have been made for the past two years for the reason that the demand for water on the high service area was really greater than the capacity of the old pumping engines, and because none could be shut down for proper inspection. In consequence, in the Murray Hill District this time last year there was not sufficient pressure during the day to raise water to the second floor of many houses. With the completion of the first fifteen-million gallon engine at One Hundred and Seventy-ninth street steps were immediately taken to overhaul the older pumps; and as the ten-million gallon engine at the Ninety-eighth street station was in the worst repair this was the first to receive attention. It has been put into thoroughly good working condition. It may be said here that the old engines at the One Hundred and Seventy-ninth street station have also been overhauled, as well as the smaller pumps at Ninety-eighth street. Specifications are now in the hands of the printer calling for two new additional high-duty fifteen-million gallon pumping engines, which will probably pump a pound of water at one-third of the cost of pumping with the present seven and one-half-million gallon engines. This will materially reduce the cost of pumping in Manhattan, which, although not excessively high, is much higher than it should be. Tests made on one of the ten-million gallon engines at the One Hundred and Seventy-ninth street station at the beginning of the year show a duty of fifty-three million foot pounds. As a result of the repairs to this engine, together with the proper adjustment of the valves, it is now giving a duty about 87 per cent. higher. This means practically that twice the water can be pumped with the same amount of coal, or the same amount of water is being pumped at an expenditure of one-half for coal. Superheaters have also been introduced at the One Hundred and Seventy-ninth and Ninety-eighth street pumping stations which will tend to increase the efficiency of the plants.

Without going into details, it is contemplated to install new boilers at One Hundred and Seventy-ninth street, redesign all the piping and put in a modern lubricating system, larger suction mains where needed, and entirely overhaul and modernize the plant. The same is true of Ninety-eighth street. For details of the work at these stations reference is made to Appendices.

I am pleased to say that the Jerome Park Pumping Station is rapidly nearing completion. The strikes of last spring delayed this work to some extent. The contractors for the stand-pipe were also very dilatory in the completion of their work, and prevented the contractor on the building from finishing the brick tower about the stand-pipe as early as he might otherwise have done. The roof is now being put on and the boilers for the station have been completed and tested and are being shipped. The water end of one of the engines is already on the ground, and the completion of the pumping machinery is under way. From present indications this plant should be serviceable by the spring of the year, unless something unforeseen happens. Its completion will be welcome in a large portion of The Bronx, where at elevations of about 200 feet the water pressure is very low. This will also enable the City to supply water to points east of the Bronx river, where at present we are obtaining the supply from the New York and Westchester Water Company. A saving of approximately sixty dollars a day to the City will be effected by the change.

As previously mentioned, contracts have already been let and a new boiler house erected for the pumping station at Tottenville, Staten Island, as well as for a new water-tube boiler; the plant has also been overhauled and the well system extended. This, in conjunction with the main laid in Amboy road, will very much improve this system.

Pumping Station Records.

I discovered, under the system of bookkeeping and records in vogue, that no accurate determination of the cost of pumping could be maintained, nor were there any regular periodical tests made to determine whether the engines were operating in an efficient manner. An account, "Maintenance of Croton Aqueduct," was kept, which included the expense of cutting the grass on the aqueducts, buying coal for the Keepers, making repairs to Central Park reservoirs, and expense to pumping stations in Manhattan and The Bronx, etc. Under these circumstances it was very difficult to know the cost of anything. A set of books, including station logs, daily statements, monthly statements and monthly records was prepared for all of the stations in all of the boroughs, and during the past summer the Chief Enginemen were instructed in the matter of keeping their logs and submitting their reports to the Assistant Engineer in charge of the Mechanical Division. Since the inauguration of this system, we are now prepared to give an accurate statement of the cost of pumping in each station in each borough. This time last year it would not have been practicable for us to say what the water was costing us at any station under our control, and as the conditions vary much in the boroughs of Queens and Richmond, this was something of a handicap in our negotiations with private companies, who were better equipped with data in this connection than was this Department. At the expense of great labor and time we have now picked out, item by item, the materials and labor chargeable to the pumping stations for the past year.

It is seen from the statements in Appendix 00, despite the unsettled conditions existing in the pumping stations owing to the repair work and changes and the installation of new machinery, that the cost of pumping has steadily decreased. It is very difficult, while work of this character is under way, to maintain a maximum efficiency. The conditions at the No. 1 Pumping Station in Queens illustrate this. In this station it has been necessary to use a temporary boiler, which was placed outside the station in a wooden shed during the construction of the new plant intended to replace the old boilers. The use of this boiler necessitated laying lines of piping exposed to changes in temperature, with the resulting losses due to condensation. Notwithstanding this fact, however, the cost of pumping at this station in the first quarter was $45.53 per million gallons pumped 100 feet high, as compared with $35.15 for the last two months of 1903. From the statements rendered, the saving in cost of pumping approximates per year:

At One Hundred and Seventy-ninth Street Station	$18,800 00
At Highbridge Pumping Station (the Highbridge Station, owing to the increased pumping capacity at One Hundred and Seventy-ninth street, and repairs made, has been shut down; this results in a direct saving, as the cost of pumping at One Hundred and Seventy-ninth street is less than one-half of the cost of pumping at High Bridge).	
At Ninety-eighth Street Pumping Station	9,600 00
At Station No. 1, Borough of Queens	7,500 00
At Station No. 3, Borough of Queens	1,100 00
At Flushing Pumping Station, Borough of Queens	657 60
At Bayside Pumping Station	1,000 00
Whitestone Pumping Station has been practically closed down, as the increased efficiency of the pumps at the Flushing and the Bayside Pumping Stations has added sufficient to the capacity of each plant to supply the Third Ward. It is seen from the appended statement that the cost of pumping at Whitestone is excessively high, amounting to $61.08, when the plant is in continuous operation. The saving effected by closing this and the Highbridge Station is hard to estimate, but it is considerable. Without considering the saving thus effected, the total net reduction in the cost of pumping for these two boroughs amounts to	$38,657 60

(B). MANHATTAN AND THE BRONX.

(1). County Division.

The County Division is under the supervision of Mr. John E. McKay, Principal Assistant Engineer. The Principal Assistant Engineer has care of all reservoirs and lands in the watershed of the Croton, Byram and Bronx rivers, including the aqueducts and gate houses and property along the aqueducts, together with the reservoirs in Central Park. Three Superintendents report to him, in charge, respectively, of the Putnam and Westchester County districts of the Croton Basin and the Bronx River District, including the watersheds of the Bronx and the Byram rivers. It is their duty to see that all masonry, embankments, gate houses, gates, fences and other property and buildings are maintained in proper condition. The aqueducts are divided into eight divisions, each under a keeper, whose province it is to maintain their respective sections in good order. In addition, the Assistant Engineer in charge of the Sanitary Patrol reports to the Principal Assistant Engineer. The Engineer in Charge of Sanitary patrol is required to make periodical inspections of the entire watershed for the purpose of locating nuisances of every kind and to promptly report the same for correction, and to maintain sanitary maps on which are located accurately all nuisances, including sectional maps of the several villages located in the Croton Basin. To the Principal Assistant Engineer also report the Draughtsmen in charge of the property maps and condemnation proceedings. He prepares and files all maps of property owned by the City and included in the County Division, and card indexes the same. His headquarters are at Highbridge. The field parties make surveys of land to be acquired for sanitary purposes and also report to the Principal Assistant Engineer.

The above is a brief outline of the organization of the County Division instituted at the beginning of 1903, and which has been found to systematize the work of this Division.

Sanitary Patrol. Katonah Laboratory.

Prior to the summer of 1902 the Bureau of the Chief Engineer for Manhattan and The Bronx had no laboratory facilities whereby it was enabled to subject samples of water to bacteriological, chemical and biological analysis. The development of the chemical and especially the bacteriological examination within the past few years has been very marked. It is now possible to determine very accurately the quality and

potability of the water delivered to the City from tests thus made, and no department of the magnitude of the Water Department of these boroughs should be without such an adjunct. The Brooklyn Water Department had established a chemical laboratory at Mount Prospect which is thoroughly equipped and under the direction of Mr. G. C. Whipple. In the summer of 1902 it was decided to extend the usefulness of this laboratory by including in the scope of its work the analysis of water supplied the other boroughs of Greater New York. Up to the beginning of 1903, however, no systematic collection of samples from the storage reservoirs had been inaugurated and the chief work of the Mount Prospect laboratory was to make spasmodic examinations of the water at the several points in Manhattan. It was very evident from the beginning that to collect samples at the various reservoirs and lakes from which Manhattan and The Bronx derived their water supply and send them to Mount Prospect laboratory would entail delay in shipment. The time consumed in transit might affect the validity of the results of the analysis. It was determined, therefore, to establish a bacteriological and biological laboratory in the heart of the watershed in order that analysis might be promptly made and any indication of pollution promptly discovered and the health of the City thereby protected. A laboratory was established at Katonah which was put in operation in July of this year in charge of the Engineer of Sanitary Patrol, and under the supervision of an Assistant Bacteriologist from the Mount Prospect laboratory. Weekly samples of the water in all the reservoirs and principal lakes in the Croton and Bronx basins are forwarded to this laboratory weekly for analysis, and reports are sent to the office of the Chief Engineer, so that he is constantly in touch with the conditions of the supply from the several sources. Although the typhoid fever death rate in Manhattan and The Bronx has been low in comparison with other American cities, from tables and diagrams prepared by the Director of the Mount Prospect laboratory it is apparent that there is a tendency towards a steady increase in the mortality resulting from enteric fevers, and it behooves this Bureau to exercise every precaution to prevent further contamination. In this connection it is well to mention that the appropriation for the maintenance of the County Division for the past few years is entirely inadequate to provide for the proper systematic patrol of the watersheds. The work of the sanitary patrol, however, has been fruitful of results and several nuisances of a serious character have been abated, among which may be noted the Montefiore Home at Bedford Station. Up to the present time the number of nuisances located, described and reported to the Board of Health is 410. These are scattered all over the territory mentioned, and the State Board of Health has been requested to secure the abtement of the same. One hundred and sixty-six abatements have been secured from parties maintaining nuisances without recourse to law. The co-operation of the Corporation Counsel has also been obtained, and after parties have had proper time to remedy unsanitary conditions, the reports are placed in his hands for such action as may be taken under the sanitary laws to obtain the necessary relief.

In addition to the location and reports on isolated nuisances, the Engineer in charge of the sanitary patrol has been engaged, in conjunction with the Director of the Mt. Prospect Laboratory, in a study of the several villages and towns within the watershed. An electrozone plant was found established for the treatment of the sewerage of the village of Brewsters. A series of tests conducted at this plant show that it is entirely effective. The plant, however, was in poor physical condition and has been repaired and enlarged. Tests made proved that a larger amount of the fluid was used in treating the sewerage than was necessary. It is proposed to make experiments at this point which will result in a decrease in the cost of the operation of the plant.

One of the most dangerous sources of pollution in the Croton shed is found at the village of Mt. Kisco. The pan system is now in vogue in parts of this town, but it is proposed to introduce a sewerage system, and it will be necessary for the City to provide means of protecting the water from the effluent. Plans have been prepared for filter beds which will shortly be submitted to the State Board of Health for approval, and appropriations will be asked for the means to install and operate them. The sanitary conditions at Lake Mahopac have also been thoroughly investigated, all nuisances located, and maps of the local territory prepared. The conditions were found such as to require either the acquisition of land about the lake under condemnation proceedings, or to construct filter beds for the protection of the City supply. The latter scheme was adopted for economical reasons and the necessary appropriations have been made and plans have been nearly completed for the construction of the same. For details of the work of the sanitary patrol reference is made to Appendix.

In addition to the bacteriological and chemical analyses made at regular intervals, and above referred to, numerous special studies have been made of the character of the water supply and the effect of varying meteorological conditions upon the same, which reflect much valuable information and which, if continued and intelligently analyzed, will throw much light on the subsequent necessary and proper treatment for the preservation of its purity and the improvement of its character. Special attention has been given to the effect of heavy rainfalls upon the number of bacteria present. The hardness of the waters in the several reservoirs and sources of supply have been determined and charted. A diagram has been prepared to show the daily changes in character and the quality of the Croton water as it enters the City, and, so far as possible, the effect of these fluctuations upon the typhoid fever death rate as determined by the Board of Health. The question of turbidity has also been taken into consideration. This diagram has been brought to date so that the variations in the color of the water, the number of bacteria, the presence or absence of bacillus coli, and the turbidity can be seen at a glance. The diagram also shows the rainfall and the number of cases of typhoid fever as reported weekly.

Condemnation Proceedings.

Land has been acquired on Cranberry pond and on each side of the outlet of the same as far as the junction with the Croton river. The buildings have been removed from the property thus taken and a large proportion of the fencing which encloses the property has been completed. The acquirement of this property removes one of the worst nuisances in the watershed. The outlet of Cranberry pond passed directly through Mahopac village, where conditions were serious. Under the Byram, Bronx and Wampus proceedings which have been in progress throughout the year a protective strip has been acquired at places where serious conditions existed in these watersheds. The Bronx supply is now well protected, and the buildings are being rapidly removed from the property. In addition to the above the College of the Christian Brothers, adjacent to the Muscoot Reservoir, has been vacated, the bodies removed from the cemetery and the buildings dismantled. As there were several hundred inmates in these buildings, which were in close proximity to one of the chief sources of supply, conditions will be very much improved in this location.

Cleaning and Grubbing.

The color of the water is almost invariably due to harmless vegetable matter in solution. It is largely acquired from swampy land in the watershed and is practically an extract of the leaves, bark, twigs, etc., which accumulate upon the surface of the ground. There is no question, however, that a public supply should have an agreeable appearance. In his report to the Commission on Additional Water Supply, Mr. Whipple states: "It is perhaps unfortunate that the characteristics of a water which make it unsafe do not at the same time render it unpalatable, but it is true to a great extent that safety and palatability of water are independent of each other. Those characteristics which render the water distasteful are recognizable by the senses, but the presence of disease is not." It is markedly true, however, that public opinion of the purity of a water supply is largely affected by the color, taste, smell and turbidity. It was found in the fall of 1902, after an examination of the various streams in the Croton watershed, that there were numerous places where the water passed through timbered land, which had not been cleared, situated in the valley bottoms, where the deposition of leaves had collected for years and years, thus giving a decided color and a peaty taste to the water. Several gangs were organized for the purpose of clearing out these bottom lands and also for the purpose of clearing the underbrush and vegetation for a distance of approximately 300 feet on each side of the streams and reservoirs. This work has been rapidly pushed by the several Superintendents of the County Division, with the result that the appearance of the property has vastly improved within the year. There is no doubt if this policy is continued and the underbrush is kept cut, that diminution in the color of the water, as well as its taste, will be manifested. In this connection surveys have been made for the acquisition of the property on each side of the east branch of the Croton between the East Branch reservoir and Paterson. Throughout this entire district there is a heavy growth of underbrush, and the stream passes almost entirely through swamp land. The effect of this is very noticeable by reference to table submitted in the report of the Director of the Mount Prospect laboratory, which shows that the color of the water in this reservoir, into which the East Branch flows, is uniformly high. Plans have been prepared and appropriations will be asked for the straightening of the East Branch, cleaning out the swamp land and building retaining walls on each side of the new channel.

General Repairs.

The usual cleaning and repairing of fences, gate houses, gates, etc., has been kept up during the year, and herewith is submitted a report of the Principal Assistant Engineer, which relates to this work, not only in the water shed, but also along the line of the aqueducts and about the distributing reservoirs in Central Park.

Automatic Register Gauges.

The methods of obtaining the heights of water in the storage and distribution reservoirs, as well as in the aqueducts at Croton Lake, were found to be very crude. It was also discovered that the readings of these depths were made not oftener than twice a day. As the fluctuations in the heights of the reservoirs vary from hour to hour, it was important that a continuous record should be kept in order that the statistical data relating to the flow of the Croton river and the yield of the Croton basin might be accurately estimated. This is particularly true at the Croton dam, where the variations are marked in very short intervals of time, and failure to maintain a continuous record might affect previous calculations of the flow. To overcome this automatic register gauges have been ordered and are now being placed in all the principal reservoirs and gate-houses, so that hereafter the flow over the Croton Dam and the level of water in the reservoirs for each minute of the day may be ascertained. For the purpose of studying the fluctuations in consumption throughout the 24 hours of the day for different seasons of the year these gauges play a very important part at the reservoirs in Cenral Park and at the One Hundred and Thirty-fifth Street Gate-house, from which points the supply is distributed to the City.

Computations of Flow Revised.

Previous computations of the yield of the Croton watershed and the estimates of the capacities of the old and new aqueducts have been carefully checked and modified to some extent. Tables have been prepared of the observed average daily flow and the natural average daily flow of the Croton river, which will be found below.

Observed Average Daily Flow of Croton River.

Sum of Aqueduct flow and waste over dam, with no correction for lowering or refilling of storage reservoirs.

Average flow for each month is here stated in million gallons per 24 hours.

Months.	1900.	1901.	1902.	1903.
January	252	248	809	648
February	876	251	611	748
March	837	271	1,810	1,138
April	352	1,030	665	666
May	396	753	349	263
June	245	373	255	483
July	253	286	253	356
August	255	640	260	269
September	255	436	267	353
October	255	486	269	910
November	254	276	265	397
December	277	341	610	394
Average for year	376	493	535	552

Note—For preceding years see Table No. 25 of J. R. Freeman's report to 1900.

Natural Average Daily Flow of Croton River.

Computed from observed flow by deducting the quantity corresponding to lowering of storage reservoirs or adding the quantity taken to refill without allowance for evaporation loss from storage reservoirs; in million gallons per 24 hours:

Months.	1900.	1901.	1902.	1903.
January	332	259	750	677
February	1,336	81	520	746
March	1,024	952	1,914	1,145
April	355	1,265	630	663
May	493	779	342	135
June	621	329	164	616
July	106	254	148	293
August	40	727	124	292
September	79	425	117	356
October	73	486	424	892
November	202	229	294	342
December	140	840	952	294
Average for year	400	554	532	.....

Note—For preceding years see Table No. 26, page 207, of J. R. Freeman's report to 1900.

Also the average daily flow of the Croton river at the new Croton dam, exclusive of storage; of the computed natural flow of the Croton river at the site of the new Croton dam; of the average daily flow per square mile of total drainage area at the new Croton dam; of the average daily consumption of Croton water; of the average daily consumption for each month and year; of the waste of water over the old Cro-

ton dam from 1900 to date; together with other tables which it is not necessary to reproduce, but which are valuable in the operation of the Department. Tables have also been prepared of the quantity of water wasted over the old Croton dam at various depths and of the capacity in United States gallons of all storage reservoirs for each inch in depth. Similar tables have been prepared for the Bronx river system. During the year several tests have been conducted to determine the exact flow of water through the new aqueduct. These tests were made by Mr. E. S. Cole with the Cole-Flad pitometer, a measuring device which will be described in the Appendix submitted with this report on the subject of water waste; and by Mr. F. R. Watkins with the Fteley current meter. Mr. Cole, with the pitometer placed on all large mains leading to the City, took readings on the same days and at the same intervals with Mr. Watkins, who took readings from his current meter at a point on the new aqueduct below Dunwoody. The tests already made do not furnish data at a sufficient number of different depths of water in the aqueduct to make it possible to give results at the present time; but it is contemplated to continue this work, which when completed should make this determination sufficiently accurate to be beyond question. No measurements could be made on the old aqueduct, as the same is not now in use, owing to changes which are being made, due to the construction of the new Croton Dam.

Below will be found a condensed summary of the flow of the Croton river for the year 1903, together with the daily consumption:

Croton River—Average Daily Flow During Fourth Quarter Ending December 31, 1903.

1. Observed Average Daily Flow of Croton River—

Sum of Aqueduct flow and waste over dam, with no correction	Oct.	909,700,000
for lowering or refilling of storage reservoirs.	Nov.	396,600,000
	Dec.	293,500,000
Average per day in fourth quarter		533,270,000
Average per day for the year 1903		552,100,000

2. Natural Average Daily Flow—

Computed from observed flow by deducting the quantity corre-	Oct.	891,800,000
sponding to lowering of storage reservoir, or adding the quan-	Nov.	341,600,000
tity taken to refill, without allowing for evaporation loss from	Dec.	293,500,000
storage reservoir.		
Average per day in fourth quarter		508,970,000
Average per day for the year 1903		.....

3. Average Daily Flow of Croton River at New Croton Dam, Exclusive of Storage—

Computed from natural flow at Old Croton Dam for the given	Oct.	947,300,000
year and month, by adding 6.4 per cent. for increase in drainage	Nov.	366,300,000
area and deducting an allowance for the evaporation loss caused	Dec.	317,700,000
by substituting water surface for land surface in the new reservoir.		
Average per day in fourth quarter		543,770,000
Average per day for the year 1903		568,400,000

4. Computed Natural Flow of Croton River at Site of New Croton Dam—

Total number of gallons delivered in each month, exclusive of	Oct.	29,357,000,000
storage draft. The figures here are the monthly aggregates	Nov.	10,980,000,000
of the daily flow given under No. 3.	Dec.	9,850,000,000
Total for fourth quarter		50,187,000,000
Total for the year 1903		206,907,000,000
Average daily flow		567,000,000
Average daily flow per square mile		1,577,000,000
Total six consecutive dry months		80,290,000,000
Daily average six consecutive dry months, per square mile		833,000,000

5. Average Daily Flow Per Square Mile of Total Drainage Area at New Croton Dam—

Computed by dividing quantities of No. 3 by 360.4 square	Oct.	2,628,000,000
miles, in gallons, per 24 hours.	Nov.	1,016,000,000
	Dec.	882,000,000
Average per day in fourth quarter		1,508,700,000
Average per day for the year 1903		1,577,000,000

6. Average Daily Consumption of Croton Water for Each Month—

October	262,000,000
November	264,000,000
December	267,000,000
Average per day in fourth quarter	264,000,000
Average per day for the year 1903	266,000,000

7. Waste Water Over Old Crotom Dam—

October	20,089,000,000
November	4,074,000,000
December	924,000,000
Total for fourth quarter	25,087,000,000
Total waste for the year 1903	101,952,000,000

Owing to the rapid development of The Bronx and the increased demand for water supply in this section, the limit of the capacity of the Bronx river works was reached several years ago. As it was apparent that the Jerome Park Reservoir would not be completed for some time to come, it was necessary to make direct connections with the old aqueduct at Gun Hill road, to supply the additional water needed in this territory from the Croton. About the first of October, 1902, this connection was completed and the Croton water was turned in the mains supplying a large portion of The Bronx west of the Bronx river. It has been found by measurement that the quantity of water supplied from the Croton amounts to about 12,000,000 gallons per day. It is evident, therefore, that for purposes of comparison of the relative consumption of Croton water in the years 1902 and 1903, a correction for this additional amount, which was previously charged to the Bronx river works and not to the Croton system, should be made for the last three months of 1902 and for the twelve months of 1903. Making this correction, the relative average consumption per day for two years is as follows:

	Gallons.
For the year 1902, per day	259,000,000
For the year 1903, per day	254,000,000

(2) Distribution System.

The important question of providing a new and additional supply of water has been entrusted to the Commission on Additional Water Supply, composed of Professor William H. Burr, Mr. Rudolph Hering and Mr. John R. Freeman. There is no question but that the requirements of Greater New York demand the immediate acquisition of more water. The average daily consumption in Manhattan and The Bronx at present exceeds the yield of the Croton, Bronx, Byram and Wampus rivers in successive dry years, such as were experienced between 1880 and 1883. It is impossible to imagine the effect of a shortage in water supply upon this cosmopolitan city, with its density of population, large manufacturing interests and the unusual number of floating inhabitants. This Bureau can only lend its feeble testimony to corroborate the findings presented in the report recently submitted by the Commission above referred to. The work of construction and development of the Croton supply is in the hands of the Aqueduct Commission, so that the province of your Chief Engineer is to maintain the dams, reservoirs and aqueducts when completed, and to provide the necessary means of distributing the water and pumping the same upon its delivery to the City. A careful study of the distribution system in Manhattan and The Bronx reveals several interesting facts.

First—In Manhattan Island, owing to the rapid developments of the apartment house, the apartment hotel and the tall office buildings, there are many sections in which the loss of pressure due to friction is excessive, owing to the congestion of population and consequent increased consumption due to the erection of these buildings. For purposes of distribution in the side streets, it has been customary to lay 6-inch mains. The average size tap for private dwellings did not exceed three-quarters of an inch in diameter. Under the new conditions the three-quarter inch taps are superseded by taps ranging from one inch and a half to two inches in diameter. To meet the new conditions a problem is presented which involves considerable expense. The solution is to substitute larger mains for the 6-inch mains now laid. This work has been inaugurated and the policy instituted of laying nothing smaller than 12-inch mains in the Borough of Manhattan. During the year contracts have been let whereby 12-inch mains will be laid in a number of streets between Eighth and Fifty-ninth streets, Lexington and Seventh avenues. In addition to the construction of the 12-inch mains in the district above mentioned, it will be requisite to reinforce a number of 6-inch mains in the lower end of the City below Canal street by laying 12-inch pipe.

Second—No sufficient provision has been made to distribute the water from the new Jerome Park reservoir upon its completion, in order to obtain the benefit of its large storage capacity. One of the chief defects of the Croton water system is that there is such a limited amount of available storage close to the City or below the impounding reservoir at Croton. Under present conditions the distribution reservoirs are only capable of storing from three to four days' supply, which would make it dangerous to close down the aqueducts at any time for necessary cleaning or repair. To properly distribute the supply from the Jerome Park reservoir will involve the construction of a large number of 48-inch mains in the principal avenues of The Bronx, among which may be mentioned two lines in Jerome avenue south and under the Harlem river, through Seventh avenue to One Hundred and Twenty-fifth street, to reinforce the present aqueducts and make the large storage capacity of the Jerome Park reservoir available for distribution in Manhattan. One 20-inch and two 12-inch lines will also be required in the Grand Boulevard and Concourse, 48-inch lines in the Southern Boulevard, and 48-inch lines in Webster avenue, to reinforce the distribution system in The Bronx, as well as a 20-inch line in upper Broadway, and a main of the same size in Riverdale avenue. There will also be required two 40-inch mains in Heath avenue, together with mains ranging in size from 20 to 12 inches in a number of streets to connect up with the large trunk lines above mentioned. The approximate total cost of developing this system will be $5,000,000.

In addition to the above extensions it will be necessary to lay a large amount of pipe in order to utilize to full advantage the Jerome Park Pumping Station, which is intended to furnish water in the higher sections of The Bronx and above an elevation of 120 feet. No estimate has been prepared of the exact cost involved in this extension, but it will have to be made in the near future. These extensions, together with the work of providing the ordinary distribution mains in The Bronx, will require a very large outlay in the near future, and will necessitate a careful study of the different service areas and a determination of their boundaries.

Third—In the district east of The Bronx, formerly supplied by the New York and Westchester Water Company, which was purchased by the City at the beginning of 1903, the piping system is deficient. The size of the mains to be laid will not compare with those required west of The Bronx, yet the cost involved will be very large. The reticulation system of the New York and Westchester Water Company was very limited and there are large sections formerly supplied by this company which have no water supply at present. This Bureau is in receipt of numerous applications daily for extension of mains. In many instances, too, the pipes are of an inadequate size. It is difficult to estimate the exact cost of the extensions to be made in this territory, but it will approximate $300,000 for the immediate future.

Fourth—The grades of the streets in The Bronx having been established at a recent date, a large amount of regrading is now in progress. In nearly all cases where the street grade is altered it is necessary to relay the main. It will require approximately $500,000 for relaying mains in this Borough, due to the changes contemplated in the near future.

The facts above presented indicate clearly that the introduction of a sufficient supply of water is not the only item or expense which confronts the City at present. The following account should be appropriated in 1904 in order to give a proper supply from the present sources and to provide the means of distributing the water derived from the extensions of the Croton system when completed:

For distributing mains in Manhattan	$500,000 00
For the large trunk line mains above enumerated for the district west of The Bronx	5,000,000 00
For distributing mains in the district west of the Bronx river	500,000 00
For relaying mains owing to changes in the grade of the streets in the Borough of The Bronx	500,000 00
For extension of mains east of the Bronx river	300,000 00
Total	$6,800,000 00

You are requested to give your very careful attention to this statement, and the Board of Estimate and Apportionment should be thoroughly acquainted with the needs of this Department in distributing the funds which have been made available by the recent reassessment.

Physical Condition of the Reticulation System.

The water waste investigation recently conducted, together with a careful examination of the sewers to discover leaky mains and an inspection of the large amount of pipe exposed in the trenches of the Rapid Transit Subway, Interurban Street Railway Company and others, reveals the fact that the pipe in general are in good condition. There is probably some pipe that should be replaced adjacent to the water front in the lower end of Manhattan, but time has not allowed a sufficient investigation to determine the locations where the plant is the weakest or the extent of the defective materials.

The gate valves used in The City of New York, however, are of obsolete design, usually of poor construction and in the lower part of the City generally in bad repair. It would be wisdom for the City to appropriate money at once to replace

the defective gates now in use. In places it is difficult to make a shut-off within reasonable limits and in a moderate space of time. In one district inspected, 20 out of 61 valves were in such condition that they could not be handled. This implies the inability to make proper shut-offs in the event of a break, which, in a section where cellars are stored with valuable merchandise, might involve heavy loss for which the City may be liable. The design of the gate valve has been already considered and plans have been perfected for a new standard, constructed on modern lines, which will not in any way increase the cost. The new standards will be used in all work done in future.

The hydrants throughout the City are in miserable repair, and there are at present in Manhattan alone some 8,000 of the old style of hydrants, which have no provision for drainage after having been used. This results in frequent freezing, which renders the hydrant useless until thawed out and repaired.

The maintenance account for this work is far more than it should be, and there is no doubt but that the substitution of a proper design of hydrant would very much lessen the operating expenses of the Department. Moreover, a hydrant which is operative at a critical time may cause delay in the operations of the Fire Department sufficient to cause large losses to property owners. To replace the hydrants mentioned would cost approximately $700,000, but this cost is inappreciable compared with the increased efficiency of the Fire Department which would result, and the annual expense which would be saved. A new design of hydrant has been prepared which, though costing less, will be far more efficient, and contracts have been let for about 1,200 intended to replace the old hydrants as they give out, or to be placed along the line of the new mains laid. In addition to the replacing of the gate valves and hydrants above mentioned, drawings have been prepared for mains of a new standard, which conform more nearly to modern practice, and numerous contracts have been let in which the new style of pipe is specified.

High Service Supply.

A portion of the Borough of Manhattan above elevation of 60± is supplied by pumping water from the Ninety-eighth street, One Hundred and Seventy-ninth street, and Highbridge pumping stations. This area includes generally the Murray Hill District, the upper West Side north of Fifty-ninth street, and the section on the East Side bounded by Ninety-sixth street, Third avenue, Sixty-third street, and Fifth avenue. Owing to the rapid development of the West Side the consumption has outgrown the capacity of the mains and pumps, with the result that the pressures in the Murray Hill District are very much reduced. During the past year new pumps have been installed at the One Hundred and Seventy-ninth Street Pumping Station, and additional mains have been laid to connect with the Murray Hill District, as a result of which the pressures have been increased in this section, and it will not be long before they are still further raised.

Owing to the acquisition of the New York and Westchester Water Company, it was necessary for this Bureau to maintain the piping system east of the Bronx river, in the Borough of The Bronx. The Board of Estimate and Apportionment appropriated $70,000 for this purpose, and a new repair company was established known as Company No. 7, with their repair shop located at Westchester. This company has been actively engaged throughout the year in putting this plant in proper physical condition and in inserting new hydrants and valves where necessary. Several lines of mains have been laid to reinforce the supply of this system. Almost the entire area is now supplied with Croton water, and in the early spring it will be possible to discontinue the purchase of water from the New York and Westchester Water Company which was necessary until these connecting mains could be completed.

Herewith will be found report of the Assistant Engineer in charge of pipes and distribution, Mr. Charles H. Bull, giving the details of the operation of his division for the year.

(3). Water Waste Investigation.

The question of water waste in New York has been given considerable attention in several reports prepared by engineers of eminent standing at the instigation of municipal officers or organizations interested in municipal affairs. Unfortunately, the authors of these reports had not the means or time to make an investigation for the purpose of determining the exact local conditions. The conclusions drawn in these several reports were largely the result of comparisons with the consumption in a few selected towns or cities which are not necessarily representative of the conditions existing in the boroughs of Manhattan and The Bronx. While personally I do not believe that such comparisons are fruitful of accurate deductions, yet they may to some extent give an intimation of what may be accomplished under certain local conditions. As a matter of fact, comparing New York with several of the larger cities in this country, it will be found that the per capita consumption is not excessive. Such cities as Buffalo, Philadelphia, St. Louis and Chicago use more water per head than does New York. While I believe that such comparisons are insidious and misleading, I mention the above fact to accentuate the fallacy in the belief that New York's present water supply will be sufficient for a number of years to come with the proper restriction in use. There is no doubt, if the necessary appropriations are made, that the present consumption of water may be reduced. The extent of such reduction is problematical. The results of the investigation so far executed would tend to show that about 15 per cent. of the water delivered to the City is wasted. With the proper inspection and liberal introduction of meters, it is probable that a large per cent. of this might be saved. In whatever is done, however, public sentiment has to be considered, and there is no question but that with the present rates charged for metered and unmetered water, an effort to extend the metered service would meet with opposition. Proper plumbing regulations, efficiently enforced, would also tend to reduce the waste, but it would be difficult to procure the necessary legislation. An inborn and inrooted feeling that water is free and its use should not be restricted, is found in all American communities, and the history of the water supply of cities and towns in this country effectively illustrates the fact that with all the publicity given to the question of water waste, the tendency shows an increase in per capita consumption rather than a reduction. This is largely due to the fact that the modern dwelling has many times the fixtures and sanitary appliances that were in use several years ago, and the demand for water for commercial purposes is continually increasing. Assuming that fifteen per cent. of the present consumption could be saved, the daily average supply of the City will equal, in the Borough of Manhattan, approximately 226,000,000 gallons a day. The maximum safe yield of the Croton in the dryest year is about 250,000,000, and the average increase in the consumption may be reckoned at 5,000,000 gallons per year. Therefore in five years, with the present apparent wastage eliminated, the City will be confronted with the problem of an inadequate water supply which it now faces. Under normal conditions it will require at least six years' time to construct any works to supplement the Croton system. Analyzed from any view point it is apparent that the City must meet the problem of extending its watershed at once.

To refer in detail to the results of the investigations which have been effected to date, it may be well to briefly describe the manner of conducting the tests.

The City was divided into large districts, the boundaries of which were so selected that the entire water supply for each could be made to pass through one or two large mains. These districts were selected with a view of obtaining typical sections of the City representing different classes of population and distinct commercial interests. For example, one district included the Murray Hill section, containing a large proportion of private residences with several large hotels. A second district was representative of the conditions existing in the tenement house section of the east side, and still another embraced the chief office buildings of the City south of Fulton street. The idea in thus selecting the districts was to obtain as rapidly as possible data which would indicate the effect of various uses upon the water supply. These districts having been isolated by shutting off the gate valves on all mains except those above mentioned, were tapped under pressure and a one inch corporation cock attached thereto, and the pipes of the Pitometer were inserted in order to obtain the record of the quantity of water flowing into the district. The instrument gives a continuous record of the rate of flow in the main, from which the quantity of water is easily calculated. Coincidentally Inspectors were sent around to obtain figures of the quantity of water supplied to the area under test through meters. The population of the district was also obtained, either from the City census records or, where necessary, by Inspectors, for the purpose of determining the non-resident population. Actual measurements were made as far as possible of the amount of water passing through leaky fixtures or faucets, and the Inspectors also gathered such other significant data as might throw light upon the investigation. The total metered consumption of the district being deducted from the total amount supplied as measured by the Pitometers indicated the amount of unmetered consumption, plus waste. Ordinarily the rate of flow between the hours of 2 and 4 a. m., as compared with the day consumption, would tend to show the amount of leakage, but owing to the fact that the pressure in the pipes maintained in New York is much lower than that in the average American city, tanks have been largely introduced, which at night fill, when the consumption is light, and provide a supply during the hours of the day when the pressure is reduced, owing to the large demand for water. This condition was very clearly illustrated in the Murray Hill district, where the capacity of the tanks, as measured, was nearly equal to the average daily supply. In several instances the districts mentioned were subdivided by shutting off the water in the smaller sections in order to locate main leakage.

In conjunction with the above-mentioned tests, Inspectors were detailed to examine the sewers for the dual purpose of locating any apparent leakage from the mains and to determine the amount of water running in the early morning hours from the spurs leading to buildings in the neighborhood adjacent. This inspection was the means of locating the buildings in which water was being wasted.

It is not advisable to give a detailed account of the instrument used in these tests, but, owing to its flexibility and ease with which it may be moved from point to point, the cost of the present investigation has been insignificant in comparison with the cost of similar investigations conducted in Liverpool and Boston. Up to the present time the water consumed in fourteen separate and distinct districts has been measured. Of these fourteen districts, in twelve a house-to-house inspection to determine the amount of waste from leaky fixtures has been completed, together with the sewer inspection. Owing to lack of appropriations it has unfortunately been necessary during the past three months to discontinue the house-to-house inspection, therefore little additional information can be added in this report to that already contained in the special report submitted to you on August 28, 1903.

In addition to the work above indicated, retests have been made in Districts 1, 3, 7, 9 and 10. This includes a complete survey embracing the house to house inspection. An interesting fact may be noted at this point that in nearly every instance the resurvey showed a reduction in per capita consumption and fixture leakage as a result of the notifications sent to property owners to repair their plumbing after the first survey.

The revenue from the metered consumption also showed an increase in each of the districts when resurveyed. Herewith is submitted a table showing the results of these several tests. The effect of the present meter rates as compared with the frontage rates upon the introduction of meters is clearly indicated in the results of these investigations. The frontage rate bears no relation to the quantity of water consumed, is no standard of measurement, and is not a proper basis of charging for water consumption. For example, one building may be twenty feet wide and two stories in height, while another may be the same width and fifteen stories in height. As a result of this system of collecting revenue the large apartment houses in the City which have not steam plants are paying little or nothing for the water consumed, as is evidenced by comparison in frontage and metered rates mentioned above. The first and most requisite movement to be made in the administration of the Department of Water Supply of Greater New York is a readjustment of rates.

One can well imagine the Consolidated Company of New York selling gas on frontage rates. Although leaky gas fixtures are not possible on account of the deadly poison which they emit, at the same time many burners which are closed with regularity and precision would be allowed to remain lighted were it not for the fact that the consumer knew that the meter was conscientiously performing its work of charging them for the gas consumed. This is true of the water supply, and the most effective remedy for the prevention of waste, leaky faucets and fixtures would be to extend the metered service. The saving effected in the consumption of water with the extension of meters to all classes of supply would unquestionably reimburse the City for the expense of the maintenance and repairs of the meters.

It is well at this time to make reference to the effect of the non-resident population on the consumption in New York City, which is shown in the appendix herewith submitted. Before disposing of the subject of water waste prevention, I wish again to emphasize the fact that the investigations so far conducted show that the leakage from the mains in the boroughs of Manhattan and The Bronx is very small.

Several special examinations have been made in the lower sections of the City south of Fulton street, where, owing to the age of the mains and the effect of the salt water on the border streets, leaks would naturally be expected to develop. In the tests made in this district, however, no apparent waste existed from this source. The same may be said of the tests made with this purpose in view in the districts Nos. 1 and 9, No. 9 being a typical west side apartment house district, bounded by Eighty-sixth street, Broadway, Seventy-second street and Riverside drive.

In conclusion it may be said that as a result of the tests made:

First—The leakage due to faulty mains is limited.

Second—The per capita consumption based on the resident population is misleading.

Third—That the loss due to faulty fixtures and plumbing amounts approximately to 30 gallons per capita per day.

Fourth—That the consumption of water on Manhattan Island for power purposes exceeds 15 gallons per capita per day.

Fifth—A readjustment of the present meter, frontage and fixture rates should be at once undertaken.

Sixth—The use of meters should be immediately extended to many classes of buildings now paying frontage rates.

Seventh—The present investigation should be extended and permanently continued.

The work done to date has not only effected the accumulation of a large amount of valuable data, as shown on the accompanying table, but has also revealed the condition of the valves, hydrants and other appliances in the reticulation system, and no plant of the magnitude of the New York Water Works should hesitate on the score of the cost to maintain an efficient inspection bureau on the lines which have already been established.

While it is not claimed that the water waste investigation conducted during the past year and the house to house investigations maintained have resulted in a decrease in the per capita consumption, at the same time it is significant to note the relative consumption of water for the past four years, as shown in the subjoined table:

*Average Daily Consumption of Croton Water for Each Month, from January, 1900, to December 31, 1903.

IN MILLION GALLONS PER 24 HOURS.

Month.	1900.	1901.	1902.	1903.
January	249	254	262	258
February	251	252	261	256
March	234	256	256	252
April	236	241	257	249
May	238	237	255	253
June	250	247	258	252
July	254	263	257	260

Month.	1900.	1901.	1902.	1903.
August	259	267	263	256
September	260	263	270	258
October	255	266	252	250
November	250	260	257	252
December	251	262	262	255
Average for year	249	256	259	254

* Table corrected for water from the Croton delivered to The Bronx since October, 1902.

Meteorological conditions have their effect upon the per capita consumption, and the winter of 1903 was mild and the summer was cool, which would tend to reduce the use of water; at the same time, the consumption in 1903 is 2,000,000 per day less than in 1901. The figures given do not represent the actual consumption, for the reason that in the latter part of 1902 a portion of The Bronx formerly supplied from the Bronx and Byram water-shed was converted to the Croton system, entailing an increased demand on this supply of approximately 12,000,000 gallons per day. Measurements were taken to determine the amount of water which was thus converted from the Croton to the Bronx, and since this time approximately 2,000,000 gallons a day has been supplied to the section east of the Bronx river, but in order to be conservative the allowance made for this change in distribution has been fixed at 12,000,000 gallons per day. If the same average increase as has been shown in the years 1901 and 1902 had been maintained in 1903 a net saving in the total consumption during the present year would amount to approximately 10,000,000 gallons per day, equivalent to but 2.5 per cent. of the total supply.

Personally, I believe that the house-to-house inspection has had a marked effect on the decrease in consumption. I offer this as an illustration of what may be accomplished by a continuance of the methods at present adopted.

At the metered rate of $133.33 a million gallons, this would indicate a saving to the City of $1,333 a day, or $486,545 a year. The expense of the investigation has been less than $35,000.

(4) General Inspection Division.

Under the scheme of reorganization put in force at the beginning of 1903, a new division was created under the above title, in charge of Transitman John E. Dergnan. He reports to the Chief Engineer and has a force of men under a Foreman in his charge. His special duties are to see that all gates and valves are in proper working condition and to continue the inspection of all pipe lines and sewers for the purpose of detecting leakage; also to continue the determination of the amount of consumption and leakage in such districts as may be hereafter selected for the purpose, and to keep data in regard to population in these various districts; to accurately determine from time to time the per capita consumption therein. He is also required to maintain records and maps showing the population in the different sections of the City. He also takes observations of the pressures in all districts in which he makes inspections, so that the Assistant Engineer of Pipes and Distribution may be in possession of data which will give him the basis for determining where larger and additional mains are needed. He also maintains the card index system of the condition of all valves and hydrants, which has been referred to in the preceding chapter. This division is especially engaged at the present time in making a sweeping examination of the entire system for the purpose of putting all the gates and valves in proper working order.

(5) Division of Complaints and Services.

This division is also a part of the general reorganization of this office. It was found that complaints of slack pressure or defective plumbing, leaky mains, etc., did not receive the proper attention, and that no record was kept of such complaints nor of the disposition made of the same. For the purpose of increasing the efficiency of the Department and for the convenience of the public making such complaints, this division was started. A Chief Inspector is placed at its head, and he keeps a record of all new taps issued and is required to prepare diagram of the property to be connected with the water mains, giving exact location of the new tap granted as well as the location of the taps already in existence. Such records were not previously kept. The Inspectors under him are sent out to investigate the complaints, and they are supposed to examine the plumbing and tanks for the purpose of determining whether they are properly equipped with ball float cocks and whether the same are in good condition for the purpose of reducing waste. Tappers who make the connection between the service pipe and the mains also report to this Inspector and are required to see that the services are located as shown on the diagrams furnished him by the Chief Inspector. A copy is kept of all answers to complaints and a record of permits granted for the use of hydrants, date of their issue, term for which issued, to whom issued and the territory covered by the permit, together with the conditions imposed.

(C) BOROUGH OF QUEENS.

(1) Pipes and Distribution.

It is not exaggeration to say that Long Island City's system of water supply is unsafe and entirely inadequate to meet the requirements of the population living in this section of the Borough of Queens. The best evidence of the condition of the service in this section is shown by the absolute incapacity of the fire apparatus to compete with the fire at the Long Island Railroad Station. Recognizing the deplorable conditions in this Ward, we at once set to work to use an appropriation of $100,000 which was found unused, and prepared several contracts for additional mains. The report attached of Mr. John A. Byrne, Assistant Engineer in charge of this Borough, will indicate the extent of these improvements. During the year 67,000 linear feet of pipe were laid in the principal avenues, with a view to reinforcing the pressures in those sections where the conditions were the worst. With these additions to the reticulation system, however, we have not yet succeeded in bringing the supply to the proper standard, because of our inability to deliver sufficient water to the distribution system due to the condition of the pumping engines and the small capacity of our pumping stations. The water supply of this Ward is derived from two pumping stations belonging to the City, which have a total capacity of two million gallons, and by purchase from the Citizens' Water Supply Company, which is now delivering four million gallons per day. The line of pipe, however, connecting up the pumping stations of this company at the head of Flushing Creek is entirely too small, and the loss of pressure due to friction is so excessive that the water is furnished to Long Island City at very little pressure. To remedy this, bids have just been opened for laying a 24-inch main from these stations to connect with our distribution system at the city line of Long Island City. This will practically double the quantity of water which can be delivered to the City. To insure additional protection in the Astoria section, contracts have been made with the North Beach Improvement Company to furnish us with 500,000 gallons a day, to assist our No. 3 Pumping Station. Careful investigation has been made, and reports are prepared upon the advisbility of acquiring the distribution system of the old Woodside Water Company. Without unforeseen delays, the supply in Long Island City, which has already been improved, should within a short time be sufficient for several years to come. The water furnished to College Point, Flushing and Whitestone is derived from plants located on Little Neck Creek, in the Town of Flushing and at Whitestone. These plants belong to the City. The repairs to these stations have already been mentioned, and at these points there is a reserve underground supply which has not been developed as yet. Contracts have already been advertised for the development of the well system at the Flushing Station, which will increase the supply by two million gallons per day. The present total consumption from these several stations is about 2,500,000 gallons per day, and, as above mentioned, contracts are already provided for additional pumps at these points to augment the present machinery. It is possible to develop an additional supply also from the Bayside Station, which will be done when necessary. Several miles of distributing mains have been laid in this section, which protect the built up areas which were formerly without water.

Specifications are prepared for an additional force main from the Flushing Pumping Station connecting with the Flushing standpipe, and a contract has been recently awarded for a distributing line in Mitchell avenue, which will add to the pressures in Whitestone and College Point. This line will connect the water systems of the three towns and prevent any possibility of failure of the service in the future. It is also proposed to construct a new force main from the Bayside Pumping Station to the College Point standpipe, which will increase the supply from this end.

In other wards of this borough the water supply is derived from private water companies, and, with the exception of fixing upon the number of hydrants and their location and maintaining a general supervision of the sanitary conditions of their water supply, this Bureau is not directly interested in the distribution. The advisability of acquiring the Citizens' Water Supply Company, which controls available water-bearing land adjacent to Long Island City, has been seriously considered, and a thorough investigation of this company's plant has resulted. An inventory of all their lands, equipment, machinery, tools and other appliances was carefully made, and the probable cost of the plant estimated. With the acquisition of this company and its undeveloped water-bearing territory it should be possible to provide Long Island City for some years to come. The question of the purchase of this company, however, has been left until the ensuing year.

There is no question but that it would be advisable for the Board of Estimate and Apportionment to appropriate from two to three hundred thousand dollars at the beginning of 1904 to still further extend the system of mains in Ward I. Unless the same aggressive policy regarding extensions in this ward is continued as it has been in the past eighteen months serious results will follow. The condition is not one to be trifled with, and the lethargic attitude of former administrations has tended to increase the difficulties in making headway to provide sufficient water.

(D) BOROUGH OF RICHMOND.

(1) Pipes and Distribution.

With the exception of a small amount of water furnished by the Tottenville pumping plant the supply of the Borough of Richmond is derived from local companies, which obtain their water from driven wells. The total estimated consumption of Richmond in January of 1903 was 5,700,000 gallons per day. Of this amount the Staten Island Water Supply Company and the Crystal Water Company furnish approximately all the water used. The water now supplied by the Staten Island Water Supply Company contains a high percentage of chlorine, which would tend to show that the limit of the capacity of their wells has been reached, and the water is hard, unpotable and unfit for boiler purposes or washing. The distribution system of both the Staten Island and Crystal companies is poor, causing excessive pressures at low elevations and inadequate service on high ground. The rates charged by these companies are unduly high, partly owing to the fact that a large proportion of the water supplied is pumped to an excessive elevation due to the faulty division of service areas just mentioned.

Much thought and consideration has been given to the question of providing this borough with an unlimited and sufficient supply of filtered water. The New York and New Jersey Water Company offered to lay mains on the island and furnish water by means of submerged pipe laid under the Kill-von-Kull, which had previously been filtered. The question of the municipal ownership of the mains on the island was subsequently discussed, together with the delivery by the New York and New Jersey Water Company of a guaranteed adequate supply of filtered water to meet the demands of Staten Island for at least ten years hence. As it was supposed that the City would ultimately furnish the water to this borough, it is proper that it should own its own distribution system. It is further possible for the City to lay out a distribution system to meet the demands for potable water for the period of time above outlined, and coincidentally lay the foundation for a reticulation system which will be useful and available hereafter. A general scheme was proposed, however, to connect with submerged pipe lines laid by the New York and New Jersey Water Company at a point on the Kill-von-Kull midway between Port Richmond and West New Brighton. This company can supply, according to their statements, 7,000,000 gallons of filtered water per day, at a pressure of 60 pounds, or sufficient to supply the present needs of Staten Island, without consideration of the future extension of their filter system.

The plans contemplate dividing the borough into three service districts. These three districts cover 99 per cent. of the area of the island, leaving a very small part above grade 360 unprovided for. This section has no population at present. The three districts are designated as low, middle and high service. The low service area includes everything below grade 70 to 85 A. M. T. This district comprises approximately 40.46 square miles, being 70.1 per cent. of the area of the borough and containing 78.7 per cent. of the population. From this it will be seen that the supply for the major portion of the island will be obtained by gravity. The middle service district includes the elevation from 70 to 85 and 220 A. M. T., comprises 14.11 square miles, being 24.5 per cent. of the total area of the borough, and contains 19.5 per cent. of the population. It was proposed to subdivide this district into two parts, the northernmost area to be supplied from a pumping station located at a convenient point on the low service distribution system, the water to be pumped to either a reservoir or standpipe located at the proper elevation to furnish adequate pressure. The southern middle service district is to be supplied from the present Tottenville Pumping Station, thus doing away with long force mains and the concomitant frictional losses, and at the same time utilizing the plant now owned by the City. The high service district includes all the territory between elevation 220 and 360 A. M. T., which embraces three square miles, being 5 per cent. of the area of the borough. The population amounts to 1.8 per cent. of the total population. This district is at present supplied by the Crystal Water Company, and it is proposed for the present to make no changes in this section, but ultimately to acquire the Clove Road Pumping Station and the mains belonging to this company, and to furnish water from wells, thereby saving pumping against an excessive head.

The total estimated cost of such a system designed to supply the needs of the island up to 1920, as outlined, excluding the cost of the Crystal Company's plant, would be approximately $1,500,000.

The consensus of the expert opinions drawn from the various reports upon the best sources for an additional water supply for Greater New York is to the effect that no future supply can be developed on Staten Island proper, due to the conformation of the land and the small amount of ground storage. On account of the character of the water supplied to a large portion of the island and the limited supply which the present companies can command, it is absolutely essential that some provision should be made for reinforcing the present system. The cost of the improvement is incommensurable with the effect upon valuable property which would result, and is, considering the population, very low as compared with the cost of work of a similar nature in settlements of the same size. There is no improvement more needed at the present time in Greater New York, and serious consideration of this question will be forced upon the municipal authorities in the near future, and it is to be hoped that the matter will be given early attention.

(2) Mechanical Division.

The improvements to the pumping station at Tottenville have been treated under the general heading above given. No further reference will be made to this part of the work.

Respectfully,

NICHOLAS S. HILL, Jr., Chief Engineer.

DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY, NEW YORK CITY.

Results of Waste Water Investigation With the Cole-Flad Pitometer.

	District No. 1.			No. 2.	No. 3.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.	No. 12.	No. 7. Retest.	No. 9. Retest.	No. 10. Retest.
Number of test	1	2	3	1	1	1	1	1	1	1	1	1				
Date of test	Dec. 17-19, 1902.	Dec. 21-22, 1902.	Jan. 9-10, 1903.	Dec. 20-22, 1902.	Jan. 10-14, 1903.	Jan. 27-30, 1903.	Jan. 28-Feb. 1, 1903.	Feb. 3-7, 1903.	Feb. 25-Mar. 2.	Mar. 5-9.	Mar. 14-20.	Mar. 28-April 1.	July 10-12.	July 24-28.	Sept. 22-25.	Aug. 18 20.
Population Statistics—																
(1) Total resident population, United States census	8,396	8,396	8,396	38,906	90,000	32,200	10,164	3,076	11,000	8,872	218,023	43,800	39,969	3,076	8,872	218,023
(2) Non-resident population estimated by canvass	3,760	3,760	3,760	.....	.....	250	.....	3,000	103,000	.....	.....	.....	.....	3,000	.....	.....
(3) Total population, resident and non-resident	12,156	12,156	12,156	.....	.....	32,450	10,164	6,076	114,000	8,872	218,023	43,800	39,969	6,076	8,872	218,023
(4) Number of families supplied on frontage rates	1,104	1,104	1,104	7,771	15,913	6,269	1,091	634	963	1,526	32,983	11,722	8,904	634	1,526	32,983
(5) Estimated population on frontage rates	7,172	7,172	7,172	32,638	66,834	30,000	4,940	3,076	3,852	6,930	138,529	39,923	3,566	3,076	6,930	138,529
(6) Population metered, resident, (1)—(5)	1,224	1,224	1,224	6,268	23,166	2,200	5,224	.....	7,148	1,942	79,494	3,877	4,353	.....	1,942	79,494
(7) Total population metered, resident and non-resident (estimated), (6)+(2)	4,984	4,984	4,984	6,268	23,166	2,450	5,224	3,000	110,148	1,942	79,494	3,877	4,353	3,000	1,942	79,494
Statistics of Supply—																
(8) Total flow measured into district	1,871,000	1,700,000	1,470,000	1,440,000	5,400,000	1,730,000	760,000	1,600,000	9,450,000	1,366,000	20,203,600	4,888,000	2,750,000	1,543,000	1,612,000	21,500,000
(9) Total flow measured out of district	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(10) Total daily supply to district in gallons per 24 hours, (8)—(9)	1,871,000	1,700,000	1,470,000	1,440,000	5,400,000	1,730,000	760,000	1,600,000	9,450,000	1,366,000	20,203,600	4,888,000	2,750,000	1,543,000	1,612,000	21,500,000
Statistics of Consumption—																
Number of houses unmetered	1,019	1,019	1,019	971	1,593	1,362	434	251	398	748	2,748	1,819	1,052	250	748	2,748
(11) Number of metered houses	389	389	389	174	493	94	35	44	1,987	39	1,489	177	319	45	39	1,489
(12) Gallons metered, average daily from records of Department	638,000	638,000	638,000	293,000	940,000	86,000	160,500	551,900	5,379,000	156,300	1,838,816	364,000	977,000	776,900	210,000	1,838,816
(13) Gallons supplied population paying frontage rates, (10)—(12)	1,233,000	1,062,000	832,000	1,440,000	4,460,000	1,664,000	599,500	1,048,100	4,071,000	1,209,700	18,364,784	4,524,000	1,773,000	766,100	1,402,000	19,661,000
(14) Total (12) and (13)	1,871,000	1,700,000	1,470,000	1,440,000	5,400,000	1,730,000	760,000	1,600,000	9,450,000	1,366,000	20,203,600	4,888,000	2,750,000	1,543,000	1,612,000	21,500,000
(15) Total plumbing leakage reported from house to house inspection	42,429	42,429	42,429	369,000	672,000	329,479	87,200	148,200	423,764	119,500	1,217,600	1,100,000	697,487	125,646	106,700	939,900
(16) Net consumption and street main leakage, (14)—(15)	1,828,521	1,657,571	1,427,571	1,071,000	4,727,500	1,400,521	672,800	1,451,800	9,026,236	1,246,500	18,986,000	3,788,000	2,052,000	1,417,000	1,505,300	20,560,000
(17)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(18)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
(19) Gross per capita consumption based on resident population, (10) divided by (1)	223	203	175	37	60	53.8	74.8	521	860	154	92.7	111.6	68.5	502	181.7	98.6
(20) Gross per capita consumption based on total population, (10) divided by (3)	154	140	121	37	60	53	74.8	263	82.9	154	92.7	111.6	68.5	254	181.7	98.6
(21) Net per capita consumption based on resident population, (16) divided by (1)	218	197.7	170.2	27.6	52.5	43.5	66.2	473	821	140.5	87.2	86.5	51.3	460.7	169.7	94.3
(22) Net per capita consumption based on total population, (16) divided by (3)	150.4	136.5	117.5	....	....	43.2	66.2	239	79.2	140.5	87.2	86.5	51.3	233.3	169.7	94.3
(23) Metered per capita consumption based on resident population, (12) divided by (6)	522	522	522	46.8	40.6	39.1	30.7	....	754	80.6	23.1	93.9	224	....	108.1	23.1
(24) Metered per capita consumption, resident and non-resident, (12) divided by (7)	128	128	128	....	....	35.2	30.7	183.9	48.9	80.6	23.1	93.9	224	259	108.1	23.1
(25) Ratio-minimum night consumption to average for 24 hours	.90	.90	.90	.50	.85	.81	.658	.814	.593	.696	.823	.656	.60	.81	.614	75.4
Leakage Inspection (House to House)—																
(26) Number of buildings inspected	599	599	599	1,047	2,078	1,375	446	284	2,094	751	4,234	2,002	1,313	301	659	4,029
(27) Number of buildings with leaky fixtures	161	161	161	713	1,115	742	199	178	.....	299	.....	.....	.....	.....	323	2,528
(28) Number of fixtures reported leaking	.....	.....	.....	.....	2,714	1,973	421	452	1,938	707	5,566	5,299	3,091	450	690	6,825
(29) Number of ball-cocks reported leaking (closets)	.....	.....	.....	.....	1,481	1,277	274	338	1,210	519	2,662	3,162	2,085	278	364	.....
(30) Sewer inspection—Date made	Dec. 17-18, 1902.		Jan. 11-12, 1903.	Dec. 19-20, 1902.	Jan. 17-18, 1903.	Jan. 30-31.	Jan. 31.	Feb. 3.	March 18-April 2.	March 12-13.	April 3-14.	April 22-30.			March 12-13.	April 3-14.
(a) Number of sewer spurs found running at night	.....	.....	.....	.....	.....	.....	.....	.....	149	78	897	570	.....	.....	78	897
Percentage of house tanks found without ball-cock	.....	.....	.....	.....	66 per cent.	18 per cent.	.....	.....	.....	16 per cent.	52 per cent.	63 per cent.	70 per cent.	.....	16 per cent.	45 per cent.
Financial Statistics—																
(32) Yearly revenue from frontage rates	$18,115 00	$18,115 00	$18,115 00	$37,315 00	$52,685 00	$38,843 00	$11,500 00	$3,858 00	$6,832 00	$18,295 00	$100,035 00	$78,545 00	$39,345 00	$3,858 00	$18,295 00	$100,035 00
(33) Yearly revenue from meter rates	31,000 00	31,000 00	31,000 00	14,550 00	45,800 00	4,180 00	7,800 00	26,931 00	262,299 00	7,600 00	89,728 00	17,706 00	47,674 00	37,910 00	10,240 00	89,728 00
(34) Total yearly revenue, (32) and (33)	$49,115 00	$49,115 00	$49,115 00	$51,865 00	$98,485 00	$43,023 00	$19,300 00	$30,789 00	$269,131 00	$25,895 00	$189,763 00	$96,251 00	$87,019 00	$41,768 00	$28,535 00	$189,763 00
(35) Yearly revenue per capita based on resident population, (34) divided by (1)	$5 85	$5 85	$5 85	$1 33	$1 09	$1 33	$1 90	$10 01	.....	$2 92	$0 87	$2 20	$2 17	$13 58	$3 22	$0 87
(36) Yearly revenue per capita based on total population, (34) divided by (3)	4 03	4 03	4 03	.....	.....	1.325	1 90	5 07	$2 36	2 92	.....	.....	2 17	6 87	.....	.....
(37) Revenue per 1,000 gallons based on total consumption, (34) divided by (8)-1,000	$0.072	$0.072	$0.072	$0.0988	$0.0498	$0.0674	$0.0697	$0.055	$0.0778	$0.052	$0.0257	$0.0539	$0.0866	$0.0742	$0.0485	$0.0248
(38) City meter rate per 1,000 gallons	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336	$0.1336
Incidental Information—																
Night Rate of Supply—																
(39) Minimum night rate in gallons per 24 hours	1,740,000	1,600,000	1,300,000	720,000	4,600,000	1,400,000	500,000	1,300,000	5,600,000	950,000	16,630,000	3,210,000	1,650,000	1,250,000	990,000	16,200,000
Total number of metered houses in district	389	389	389	174	493	94	35	44	1,987	39	1,489	1,819	.....	44	51	1,489
(40) Number of large meters read at night	20	20	20	7	33	.....	12	14	44	13	24	18	31	16	13	16
(41) Total night rate of large meters read, gallons, 24 hours	157,000	157,000	157,000	5,299	540,000	.....	93,150	411,000	870,363	71,900	112,087	66,035	397,000	797,000	79,100	112,087
(42) Estimated total night rate for all meters, gallons, 24 hours	574,000	574,000	574,000	150,000	800,000	69,700	105,800	448,000	3,190,000	108,900	1,522,000	238,784	586,000	797,000	115,000	1,522,000
(43) Night rate of net unmetered consumption	1,123,571	983,571	683,571	201,000	3,127,500	1,000,821	307,000	703,800	1,986,236	721,600	13,890,400	1,871,216	367,000	328,000	875,000	14,678,000
(44) Night rate of net unmetered consumption per capita, (43) divided by (5)	157	137	95.3	6.1	46.8	333.6	62.2	229	516	104	100.1	46.9	10.3	106.9	126	67
(45) Approximate area of district in acres	127	127	127	70	168	174	58	260	230	75	310	196	204	260	75	310

Long Island City, December 31, 1903.

NICHOLAS S. HILL, Jr., Esq., Chief Engineer, Water Supply, Gas and Electricity, Nos. 13-21 Park Row, New York City:

Dear Sir—I hereby respectfully submit my report of work performed by the Mechanical Division during the year.

Boroughs of Manhattan and The Bronx.

February 9, 1901, a contract was entered into with H. R. Worthington to install two 15 million gallon pumping engines, boilers and all appurtenances in the One Hundred and Seventy-ninth Street Pumping Station. After numerous delays, caused by strikes and lack of facilities in the Worthington shops to turn out the work, the first engine was not put into service till March 17 of this year, and after running about two weeks, it was shut down to repair the damage done to the journals of the compensating cylinders, caused by defective construction and improper lubrication, and when the trouble was finally corrected this engine was put into regular service, not a whit too soon, as the other machinery in this station, and also that in the Ninety-eighth street station, was in such bad state of repair that there was imminent danger of serious breakdowns in both stations. Owing to the poor condition of these plants, it was impossible to maintain the normal water pressures throughout the high service districts. The precarious conditions prevailing in these plants was well known to the authorities, but it was impossible to overcome them until the first new engine was put into service in the One Hundred and Seventy-ninth street station; and had this pump and the second one been ready for use in the time specified in the contract, these distressing conditions would not have resulted.

The ten million gallon pumping engine in Ninety-eighth street pumping station was in worse condition than any of the other engines in the borough, and in consequence was the first to be shut down and thoroughly overhauled and put in a complete state of repair. When this was done, the water ends of the four Blake engines in One Hundred and Seventy-ninth street station were fitted with new valve-studs and valves, where necessary, and the pressures were at once increased throughout the districts supplied.

From April 16 of this year to May 17, the slip in the Blake pumps in One Hundred and Seventy-ninth street station was about 55 per cent., as determined by Pitometer gaugings taken in the main suction pipe to the pumps, and from May 17 to the present, the slip in these pumps has been about 4 per cent. as determined by the Pitometer. These Pitometer gaugings were approximately verified by myself on April 29, by closing the force main valves on engines Nos. 2 and 4, and noting the number of revolutions made by the engines against the regular working pressure at the pumps. The slippage thus determined averaged about 63 per cent. After the water-ends had been repaired, the steam-end of No. 4 engine was thoroughly overhauled, and now this engine is in excellent state of repair, with the exception of the high pressure piston rod, which is scored so that it is impossible to keep the stuffing-box tight. This rod is to be replaced with a new one.

After the completion of the work on No. 4 engine, the repairs to the steam-ends of the remaining three Blake engines were not gone on with, as it is impossible to lay up any one of these engines till both of the Worthington engines are put into continued service, or unless the old High Bridge station is started up again.

The second Worthington engine was started up and put into service November 17, and after running about a week in conjunction with the first Worthington, or No. 6 engine, was found to be all right. No. 6 engine was then shut down and is undergoing some minor repairs and is having the system cylinders, reheaters, piping, etc., lagged, and when this is done, the same work will be done on No. 5 engine. These engines will then be ready for the final or duty tests. When the two Worthington engines are put into continued service the needed repairs to the remaining three Blake engines will be gone on with.

Engines No. 1 and No. 2, in the Ninety-eighth Street Pumping Station (each 7,500,000 capacity), which were installed in 1879, were in a very bad state of repair, and one of them, Engine No. 1, went out of service by one of the plunger rods breaking in two. This happened the night of July 17 of this year, and owing to delays in getting necessary orders out to make repairs and also to stop delays this engine was not gotten into service again till November 12. While out of service, it was thoroughly overhauled, and is now in as good condition as new. Engine No. 2 is in as bad condition as was No. 1, and when funds become available next January the work of overhauling and repairing this engine will be continued. At the present time Worthington is getting out the necessary duplicate repair parts.

With the starting up of the first Worthington engine, and the repairing of the water ends of the Blake engines, and the repairing of the Ninety-eighth street engines, we were enabled to shut down the old Highbridge Station and still maintain normal water pressures.

Specifications are being prepared for building and installing two new 15,000,000-gallon pumping engines, boilers and all appurtenances in the Ninety-eighth Street Station to replace the present 7,500,000-gallon engines, which will be too small to meet the demands on this station in the near future.

On January 20 of this year a contract was awarded to the Power Specialty Company to furnish and install superheaters in One Hundred and Seventy-ninth street and in Ninety-eighth street pumping stations. In One Hundred and Seventy-ninth Street Station this has been done, and the superheater has been in use for some time past, but owing to unavoidable delays on the part of the City in providing a desirable site for this apparatus, the work is not as yet completed in the Ninety-eighth Street Station, but will be by the end of this month.

In order to provide the above mentioned site for the superheater it was necessary to install two new feed-pumps and get them into service, and then take out the four old feed-pumps, which have been trucked to the Borough of Queens for use in the pumping stations there.

Plans and specifications are being prepared to remove the eight horizontal, return-tubular boilers in One Hundred and Seventy-ninth Street Station, and to install in their place new water-tubular boilers, piping, and all appurtenances, and an additional superheater, which, in conjunction with the one now in use, will superheat the steam for the entire plant. It is also the intention to remodel the piping system and to provide a suitable storage for oils, and to install an approved oil-feeding system, and thus do away with the present unclean and expensive method of carrying oil to the machinery. It is also intended to put feed-water heaters in the main exhausts of the four Blake engines, and thus get the benefit of this exhaust heat.

Plans and specifications have been prepared to place monitors on the roofs of the boiler and engine houses of both the One Hundred and Seventy-ninth Street and the Jerome Park Pumping Stations, and thereby provide a much needed means of properly ventilating these buildings.

Plans and specifications are also being prepared to take out the present inadequate and expensive coal conveyer system in the One Hundred and Seventy-ninth Street Pumping Station, and to install in its place one of a more modern and approved type.

Plans and specifications have also been prepared to lay an additional 36-inch supply line to the pumps in the One Hundred and Seventy-ninth Street Station. This line is to branch off from the southerly 48-inch overflow line from shaft No. 26, which line is to be supplied from shaft No. 26 by placing literal stop planks to prevent the water from flowing into the northerly 48-inch overflow line when the present stop planks are removed to supply the new line.

Borough of The Bronx.

The work on the Jerome Park Pumping Station is still unfinished, and, owing to a contemplated change in the roof structure to provide proper ventilation, the building will not be finished this year. It is important that some measures should be taken to expedite this work, as parts of the water ends of one of the pumping engines are on the ground and the remaining parts are on the way to the station.

One of the boilers for this station has been shipped from the I. P. Morris Shops, in Philadelphia, and the other two and the breechings for all three are to follow at intervals of three days. Before the end of the month they will be in course of erection.

The steam-end of one pump is now being erected in the Worthington Shops, and by the latter part of the month it will be ready to be taken down and shipped. It will probably be some time in March next when this engine will be ready for steam.

As soon as the first steam-end is taken down the steam-end of the second engine will be ready to be erected in the shop. The water-end of the second engine is in the shops of the George F. Blake Manufacturing Company, Cambridge, Mass., and from what I can learn is nearly completed. The contract for this work was let to H. R. Worthington June 24, 1901.

The contract for building and erecting the standpipe and tank in this station was let to the firm of Snare & Triest July 3, 1901. The work has been completed all but furnishing new manhole plates for the tank and standpipe to replace the ones now on the ground which do not fit, and leading to a few joints in the 48-inch outlet pipe, and also cutting out and redriving a few defective rivets. The contractor has been instructed to attend to these matters.

Borough of Richmond.

The contract for building a new brick boiler house and a frame storehouse at the Tottenville Pumping Station, which was awarded July 9 of this year to Philip Wolff & Son, of Stapleton, S. I., has been completed and the final payment has been forwarded.

The contract for building and installing one 100 horse power water-tube boiler, which was awarded June 17 of this year to Frank McSwegan & Sons, has been completed, all but a little brickwork and cleaning up.

The four new deep-well pumps installed last year by Downie are giving good satisfaction. The normal water pressures have been maintained throughout the year, it being necessary to pump only sixteen hours a day to maintain them. The average daily consumption for the year was 125,000 United States gallons.

One of the old deep-well pumps that was not in use was shifted to another well to replace a pump that is in need of repairs, and the well from which the pump was taken has had a float placed in it and connected to an indicator in the well house, and hourly readings are being kept of the subterranean water level. During the year a self-recording rain gauge was placed at the Tottenville Pumping Station. It appears to be working satisfactorily.

Mr. Butler and his men have been kept busy in and around the pumping station grounds, and putting in taps and looking after the water gates and hydrants.

Borough of Queens.

Since January 1 of this year a great deal has been done towards the improvement and betterment of the condition of the pumping stations in this borough. The working forces in the stations have been reorganized and a better system introduced than that which was in vogue.

When the present management took charge there were no regular house or station shifts, no discipline and no apparent responsible management and supervision, and no proper forms to record the operations of the plants.

Lack of attention to the wants and requirements of the Enginemen in the stations was evident everywhere, and as a result the conditions in the stations got continually worse.

In Station No. 1, First Ward, the conditions were such that the health of the employees was constantly in jeopardy. The cellar of the engine room was thick with filth of all kinds, and the water that accumulated there from seepage and leaks in water and steam pipes was allowed to remain to keep this filth submerged.

The machinery was in a deplorable state of repair, and the building was in sore need of repairs, cleaning and painting.

In this station there were two pumping engines, a two-million gallon Worthington compound condensing and an old Holly pumping engine of about four million gallons capacity, installed in 1874. The Worthington engine was pumping about 70 per cent. of the amount of water that was reported, and the Holly about 50 per cent.

The Worthington engine was thoroughly overhauled by H. R. Worthington, and is now as good as new.

The Holly engine has since been taken out and replaced with a one-million gallon Worthington compound condensing pump that was taken out of the abandoned pumping station in Whitestone. The consensus of opinion was that there was not more than one million gallons of water available at this station, and in view of this fact the dilapidated old Holly engine was removed and the smaller engine installed, and is now in constant service, as with this pump all the water available can be pumped with a much less consumption of coal than before. The consumption of coal when the Holly was in service averaged about 5,800 pounds per day, and the two-million Worthington, before repairing, about 4,500 pounds, and since repairing, about 3,400 pounds per day, while the smaller Worthington consumed about 2,700 pounds per day when getting steam from the old boilers just taken out, and when the new boilers are in service it is expected that we shall do still better. We are also able to maintain better water pressures with this recently installed pump.

This station is now in an excellent condition. The cellar of the engine room has been thoroughly cleaned out, and the floor of same graded to drain the seepage water to a pump from where it is pumped out. A great amount of old and unnecessary steam and water pipes were taken down and out of this cellar, and the side walls and engine foundations were whitewashed, and this former filth receptacle is no longer a menace to health.

The old flooring in the engine room was taken up and new girders, floor beams and a yellow pine flooring were placed. The rotten timbers, frames and sashes in the monitor in the roof were removed and replaced with new ones; a new tin-roof covering and new ventilators were placed; the slate roofing of the engine room was repaired, and a galvanized iron cornice gutter was placed round the building. (this building never had gutters), and new window frames and sashes were placed throughout the building. The walls of the building were repointed and the building was thoroughly painted inside and out.

The southerly wall of the boiler-house was so badly bulged, and the foundations so poorly made, that it was found necessary to take them down and replace them with an entire new and deeper foundation wall and a new side wall.

The flashing between the engine and boiler-house had rusted away and was replaced with copper, and the two large ventilators, one of which was missing, and the other as good as missing, were replaced with new ones of galvanized iron, with copper flashing.

The platform extending part way round the engine-room was in imminent danger of collapsing, as the posts supporting same had rotted at the bases, where they had been in the filth and water in the cellar. These posts were cut off to good material and brick piers built under them. A new hardwood flooring was placed, a new stairway was built to replace the dilapidated one from this platform to the engine-room floor, and the black walnut railing was cleaned and refitted and missing part renewed. A wainscoting was also placed round the engine-room and round the wall on the platform level.

The pumping machinery has been painted with enamel paint and striped, stenciled and varnished, and the engine-room and platform floorings have been planed and varnished and rubber matting has been placed in all aisles and around the room where necessary, and when all has been finished as contemplated this station that was a veritable wreck will vie with Bayside for the honors.

Plans and specifications are being prepared to place a high iron railing around the property of this station to enclose the coal bin, buildings and large suction-well vent. This will stop large raids on the coal that is now exposed to those who are susceptible to temptation. It is the intention also to properly lay out and grade the grounds round the station.

On November 9, 1902, a disastrous explosion occurred at Pumping Station No. 2, First Ward, completely wrecking the building and damaging the machinery. At this station there were two pumping engines, one a Worthington compound condensing and the other a Guild & Garrison, each about 2,000,000 gallons capacity. As there was only one pumping engine in Station No. 3, First Ward, it was deemed advisable to move the Worthington pump to this station. The old abandoned boiler and its foundations in this station were taken out and new foundations prepared in their place, and the Worthington pump set and lined up on same. Necessary repairs to this pump were made and some missing parts furnished, and by the end of the month this pump will be ready for steam. The Guild & Garrison pump is at the Corporation yard and is probably in good condition, as some repair parts had been ordered before the explosion and delivered after. This pump is to be sold at auction. A number of improvements that could be made by our own employees were contemplated and started, but owing to the constant demands made for their ser-

vices elsewhere, particularly in Pumping Station No. 1, we are not as far advanced as we should like to be, but by the end of the year it is expected that we will have the carpenter work and painting in the station about finished.

With the exception of Station No. 1, there were no wagon scales at any of the pumping stations, and the coal delivered was weighed at the dock, a very unsatisfactory way, as it was impossible for the Engineman to know the amount of coal delivered February 28, 1903, of this year a contract was awarded to F. F. Meyer, Jr., Newark, N. J., to set at each of the pumping stations a ten-ton wagon scale, and when this was done the Enginemen at the stations were required to weigh the coal delivered. This policy was carried out when possible to do so, but at times, when Enginemen were away for various causes, leaving us shorthanded, it was necessary to have some employee from the office assigned to the work of weighing.

The coal bins at these stations were dilapidated, unsightly and not of sufficient capacity, and in consequence bids were taken and a contract was awarded to Frank A. Ray to build new bins at Stations No. 1 and No. 3, First Ward, and at Whitestone Station, Third Ward.

It was found that there were no suitable facilities for storing supplies at any of the stations, and as a large number of various kinds and much-needed supplies were ordered for all the stations, plans and specifications were prepared, bids were taken and a contract was awarded to Frank A. Ray to build a storehouse at Pumping Station No. 1, First Ward, and at Bayside Pumping Station, Third Ward, and rooms in the house adjoining the Flushing Pumping Station were converted into storerooms, and it is contemplated to convert the present boiler room of Station No. 3 into a storeroom when the new boilers are in service.

Upon taking charge here, it was found that the boilers in all the pumping stations, with the exception of Whitestone, were not fit to be continued in service, although those in the First Ward were not in service longer than six years, while those in Flushing and Bayside were in use since 1874; consequently plans and specifications were prepared and contracts let for new boilers in the First Ward to Frank McSwegan & Sons, who are installing a battery of two horsepower Babcock & Wilcox boilers in Station No. 1 and in Station No. 3. Those at Station No. 3 are ready for the breeching and steam and water piping, but as these are provided for in another contract, which is now being advertised, it is impossible to say when these boilers will be put into service. It cannot be too soon, as the one boiler in this station is in little better condition than the Station No. 1 boilers that have just been removed, and as it is a difficult matter to properly clean and scale this boiler, as it cannot be put out of service for a sufficient length of time.

The old boilers have been taken out of Station No. 1, and the foundations are being prepared for the new ones. The station is now furnished with steam from a temporary boiler.

The contract for furnishing and installing the new boilers in the Third Ward was awarded to the firm of Williams & Gerstle, of New York, who have installed Heine boilers, a battery of two in Flushing and in Bayside Station.

The Flushing boilers are now being connected up with breeching and a temporary flue to the existing chimney, while the Bayside boilers, although ready, cannot be connected up till a contract now being advertised is let and the work of building a new chimney at this station and at Flushing Station is completed. As the waters fed to the boilers in Stations No. 1 and No. 3 are of a nature, unless properly treated, to ruin any boiler, plans and specifications were prepared and a contract let to Frank McSwegan & Sons to install in each of these stations combination purifying, softening and heating apparatus. This apparatus is on the ground ready to be installed when the locations provided for on the plans are available.

Upon taking charge the Flushing Pumping Station was found to be in almost as bad condition as Station No. 1, First Ward. The window sashes and most of the door frames and doors were falling apart; the engine-room cellar was in a filthy condition, and the building was in need of a thorough cleaning. The pumping machinery in this station consists of a Worthington tank engine of about one and one-half million gallons capacity, installed in 1874, and a Snow Cross compound crank and fly wheel engine of two million gallons capacity, installed in 1899. The Worthington engine would require a considerable expenditure of money to put it in proper state of repair. It is now used only when necessary, when the Snow pump is shut down. As this engine has been in service so many years, and as it is not large enough for the future demands on the station, it was thought advisable not to overhaul this engine and make extensive repairs. A contract has been awarded to the Snow Steam Pump Company to take this engine out and to build and install a three million-gallon pumping engine in its place. We found the Snow engine now in the station was in such bad condition that there was imminent danger of a complete breakdown. This engine was temporarily put out of service, and an order issued on the Snow Pump Company to make the necessary repairs. These repairs were well made and the engine is now in good condition.

The building has been thoroughly cleaned and painted, and new sashes, window frames and doors have been put in.

During the year the following contracts were let and the work completed:

Building coal bins at Pumping Stations Nos. 1 and 3, First Ward, and at Whitestone Pumping Station, Third Ward; name of contractor, Frank A. Ray; date of contract, March 4, 1903. Estimated cost, $3,300.

Building storehouses at Pumping Station No. 3, First Ward, and at Bayside Pumping Station, Third Ward, and an office, storeroom and shed at the Corporation Yard, Third Ward; name of contractor, Frank A. Ray; date of contract, March 4, 1903. Estimated cost, $2,880.

Furnishing and setting a ten-ton wagon scale at each pumping station in the Borough; name of contractor, F. F. Meyer, Jr.; date of contract, February 28, 1903. Estimated cost, $1,065.

Building and installing two 170 horse-power water tube boilers in Flushing and in Bayside Pumping Stations; name of contractors, Williams & Gerstle. Estimated cost, $15,820.

Contracts Under Way.

Furnishing, delivering and storing 3,600 gross tons of egg size white ash anthracite coal; name of contractor, Joseph E. Ennis; date of contract, April 23, 1903. Estimated cost, $21,492.

Building and installing two 100 horse-power water tube boilers in Pumping Stations Nos. 1 and 3, First Ward; name of contractors, Frank McSwegan & Sons; date of contract, June 17, 1903. Estimated cost, $11,200.

Furnishing and installing a feed water heater and purifer in Pumping Stations Nos. 1 and 3, First Ward; name of contractors, Frank McSwegan & Sons; date of contract, August 4. 1903. Estimated cost, $2,020.

Furnishing materials and driving wells at Pumping Station No. 3, First Ward; name of contractor, Thos. B. Harper; date of contract, September 8, 1903. Estimated cost, $11,431.

Building and installing a pumping engine at Flushing Pumping Station, Third Ward; name of contractors, Snow Steam Pump Company; date of contract, October 30, 1903. Estimated cost, $14,300.

Plans and specifications have been prepared for the following work:

Furnishing materials and driving wells and installing an air lift system at the Flushing Pumping Station, Third Ward.

Building foundations and a steel stack at Pumping Station No. 3, First Ward; building and connecting up breeching and flues to stacks, and furnishing materials and connecting up the steam and water piping of the new boilers at Pumping Stations Nos. 1 and 3, First Ward, and at Flushing and Bayside Pumping Stations, Third Ward.

Building foundations and a new chimney at Flushing and at Bayside Pumping Stations. The foregoing specifications are on the table for bidders at this time.

Furnishing and placing an iron railing round the property of Pumping Station No. 1, First Ward.

Building and installing a four-million gallon pumping engine in Bayside Pumping Station.

Building extension to the engine house, a new boiler house and a new coal house at Bayside Pumping Station.

Furnishing all labor and materials and building new boiler house at Pumping Station No. 3, and building a drain in front of this station; excavating for and taking off the arch of the tunnel from engine room to receiving well at Station No. 1; putting new roof covering on the coal house; water-proofing the foundation walls of engine house; laying a drain from the pond at this station to the meadows near Thomson avenue, and painting the chimney, building a new boiler house and a monitor in the roof of the engine house at Flushing station.

Building and installing a receiving tank on the well line in Station No. 1, and placing surface condensers and air pumps on the two pumps in this station and on the Snow pump in Flushing station.

Since the six-inch line was laid connecting Whitestone system with that of Bayside we have been able to practically shut down the Whitestone pumping station and supply Whitestone with a better pressure from Bayside and Flushing through this new six-inch line and through the old four-inch connection between Flushing and Whitestone, without decreasing the pressures in either Bayside, Flushing or College Point. It has been necessary, however, to keep a banked fire at Whitestone station to be in readiness in case a fire of any magnitude should occur when the six-inch and four-inch lines would not probably furnish sufficient water.

We have been fortunate this year in having ample rainfall to keep the wells and ponds well supplied, and for this reason we have been able to do without Whitestone station. When the contemplated large mains are laid between and from the pumping stations in this Ward and to Whitestone, and with the additional supply expected from the proposed wells at Flushing, we will be enabled to permanently abandon the Whitestone pumping station, which now costs so much to maintain either in or temporarily out of commission.

From the fact that it is necessary to have the full complement of men at this station, it naturally appears much more expensive to maintain this station temporarily out of service than to pump the required amount for Whitestone from here; but, taken collectively with the other two stations, it is less expensive to the Department to pump the amount of water required for the whole Ward from the Flushing and the Bayside stations.

Hot water meters are being placed in the feed lines to the boilers in all the stations, with mercury wells attached, and the meters so connected as to be readily callibrated without having to remove them, and the steam lines are being tapped to attach a separating calorimeter when at any time complete evaporative tests can be made and kept with the other records of the stations. Forms have also been introduces in all stations to keep complete records of operations.

With the inadequate force of men at our disposal during the year it has been impossible to keep the ponds in the Third Ward, Borough of Queens, as clean as they should be. I would recommend that an addition of six Laborers be made to the pumping station forces, to be used as a floating gang for cleaning the ponds and for keeping the pumping stations and the grounds round same in proper condition.

During the year a Bricklayer, a Carpenter and two Painters have been added to the working forces, and they have been kept constantly busy doing much needed repairing and painting at the several pumping stations, and there is still much in their lines to be done and there always will be to keep these stations in proper repair and looking as they should.

In the Ninety-eighth street station in Manhattan Borough the standpipe has just been scraped and painted, and when the materials are received the intention is to have our Painters paint the interiors of Ninety-eighth street and One Hundred and Seventy-ninth street stations.

I append herewith statement of cost of pumping in the boroughs of Manhattan and Queens.

Respectfully submitted,
(Signed) JOHN W. McKAY,
Assistant Engineer in Charge of Mechanical Division.

BOROUGHS OF MANHATTAN AND THE BRONX.

Report of Ninety-eighth Street Pumping Station for Quarter Ending March 31, 1903.

Total number of gallons pumped	2,083,053,140
Average total lift, dynamic feet	84.064
Gallons pumped 100 feet high	1,751,117,812
Total pounds of coal burned	3,756,470
Gallons pumped 100 feet high per pound of coal	466.07

Cost of Pumping.

Station payroll	$4,310 11
Fuel	12,269 30
Repairs to machinery, etc	1,163 97
Oils, waste, packing, etc	412 52
Small supplies	197 10
Total cost	$18,353 00
Cost of pumping 1,000,000 gallons 100 feet high	$10 40
Average daily pumpage for quarter, U. S. gallons	23,145,035

Report of Ninety-eighth Street Pumping Station for Quarter Ending June 30, 1903.

Total number of gallons pumped	1,870,644,605
Average total lift, dynamic feet	86.664
Gallons pumped 100 feet high	1,621,187,476
Total pounds of coal burned	3,414,260
Gallons pumped 100 feet high per pound of coal	474.82

Cost of Pumping.

Station payroll	$5,509 00
Fuel	6,981 05
Repairs to machinery, etc	1,163 97
Oils, waste, packing, etc	360 57
Small supplies	197 10
Total cost	$14,211 69
Cost of pumping 1,000,000 gallons 100 feet high	$8 76
Average daily pumpage for quarter, U. S. gallons	20,551,688

Report of Ninety-eighth Street Pumping Station for Quarter Ending September 30, 1903.

Total number of gallons pumped	1,582,738,124
Average total lift, dynamic feet	86.247
Gallons pumped 100 feet high	1,365,077,749
Total pounds of coal burned	2,773,950
Gallons pumped 100 feet high per pound of coal	492.10

Cost of Pumping.

Station payroll	$4,688 80
Fuel	6,563 30
Repairs to machinery, etc	1,163 97
Oils, waste, packing, etc	335 52
Small supplies	197 10
Total cost	$12,948 69
Cost of pumping one million gallons 100 feet high	$9 48
Average daily pumpage for quarter, U. S. gallons	17,203,682

Report of Ninety-eighth Street Pumping Station for First Two Months of Last Quarter.

Total number of gallons pumped	1,071,966,115
Average total lift, dynamic feet	84.347
Gallons pumped 100 feet high	904,175,645
Total pounds of coal burned	1,715,354
Gallons pumped 100 feet high per pound of coal	527.10

Cost of Pumping.

Station payroll	$3,029 35
Fuel	4,058 58
Repairs to machinery, etc	775 98
Oils, waste, packing, etc	206 20
Small supplies	131 40
Total cost	$8,201 51
Cost of pumping one million gallons 100 feet high	$9 07
Average daily pumpage for quarter, U. S. gallons	17,573,215
Total pumpage for the eleven months ending November 30, 1903, U. S. gallons	6,608,401,984
Average daily pumpage for the eleven months, U. S. gallons	19,785,634

Total Pumpage of All Stations for Eleven Months Ending November 30, 1903.

One Hundred and Seventy-ninth Street Pumping Station, U. S. gallons	10,507,373,315
High Bridge Pumping Station, U. S. gallons	1,222,182,212
Ninety-eighth Street Pumping Station, U. S. gallons	6,608,401,984
Total, U. S. gallons	18,337,957,511
Average daily pumpage, high service, U. S. gallons	54,904,065

Report of One Hundred and Seventy-ninth Street Pumping Station, Quarter Ending March 31, 1903.

Engines Nos. 1 and 3—	
Total number of gallons pumped	609,129,086
Average total lift, dynamic feet	221.277
Engines Nos. 2, 4 and 6—	
Total number of gallons pumped	1,813,492,444
Average total lift, dynamic feet	93.62
Total number of gallons pumped, all engines	2,422,621,530
Number of gallons pumped 100 feet high	3,047,104,288
Total pounds of coal burned	3,791,815
Gallons pumped 100 feet high per pound of coal	803.60
Cost of Pumping—	
Station payrolls	$4,807 45
Fuel	11,624 32
Repairs to engines, pumps, boilers, etc	675 06
Oils, waste, packing, etc	905 83
Small supplies	238 68
Total cost	$18,251 34
Cost of pumping one million gallons 100 feet high	$5 98
Average daily pumpage for quarter	26,918,017

Report of One Hundred and Seventy-ninth Street Pumping Station, Quarter Ending June 30, 1903.

Engines Nos. 1 and 3—	
Total number of gallons pumped	691,836,061
Average total lift, dynamic feet	225.226
Engines Nos. 2, 4 and 6—	
Total number of gallons pumped	2,024,576,594
Average total lift, dynamic feet	97.23
Total number of gallons pumped, all engines	2,716,412,655
Number of gallons pumped 100 feet high	3,519,240,057
Total pounds of coal burned	4,431,885
Gallons pumped 100 feet high per pound of coal	794.07
Cost of Pumping—	
Station payrolls	$5,616 28
Fuel	9,605 48
Repairs to engines, pumps, boilers, etc	675 06
Oils, waste, packing, etc	1,053 09
Small supplies	238 68
Total cost	$17,188 59
Cost of pumping one million gallons 100 feet high	$4 88
Average daily pumpage for quarter	29,850,688

Report of One Hundred and Seventy-ninth Street Pumping Station, Quarter Ending September 30, 1903.

Engines Nos. 1 and 3—	
Total number of gallons pumped	622,263,867
Average total lift, dynamic feet	225.416
Engines Nos. 2, 4 and 6—	
Total number of gallons pumped	2,342,706,462
Average total lift, dynamic feet	100.80
Total number of gallons pumped, all engines	2,964,970,329
Number of gallons pumped 100 feet high	3,768,565,981
Total pounds of coal burned	4,304,480
Gallons pumped 100 feet high per pound of coal	875.49
Cost of Pumping—	
Station payrolls	$7,006 97
Fuel	9,781 14
Repairs to engines, pumps, boilers, etc	675 06
Oils, waste, packing, etc	998 18
Small supplies	238 68
Total cost	$18,700 03
Cost of pumping one million gallons 100 feet high	$4 96
Average daily pumpage for quarter, gallons	32,227,938

Report of One Hundred and Seventy-ninth Street Pumping Station, First Two Months of Last Quarter, 1903.

Engines Nos. 1 and 3—	
Total number of gallons pumped	419,630,101
Average total lift, dynamic feet	227.38
Engines Nos. 2, 4 and 6—	
Total number of gallons pumped	1,983,738,700
Average total lift, dynamic feet	104.00
Total number of gallons pumped, all engines	2,403,368,801
Number of gallons pumped 100 feet high	2,743,279,055
Total pounds of coal burned	3,128,509
Gallons pumped 100 feet high per pound of coal	876.86
Cost of Pumping—	
Station payrolls	$4,307 98
Fuel	7,108 94
Repairs to engines, pumps, boilers, etc	450 04
Oils, waste, packing, etc	850 15
Small supplies	159 12
Total cost	$12,876 23
Cost of pumping 1,000,000 gallons 100 feet high	4 69
Average daily pumpage for quarter, gallons	39,399,488
Average quarterly cost of pumping 1,000,000 gallons 100 feet high	$5 12
Total pumpage for the eleven months ending November 30, gallons	10,507,373,315
Average daily pumpage for the eleven months, U. S. gallons	31,459,201

Report of High Bridge Pumping Station for Quarter Ending March 31, 1903.

Total number of gallons pumped	651,645,916
Average total lift, dynamic feet	104.33
Gallons pumped 100 feet high	679,400,594
Total pounds of coal burned	1,770,800
Gallons pumped 100 feet high per pound of coal	383.67
Cost of Pumping—	
Station payroll	$2,497 45
Fuel	5,477 12
Repairs to machinery, etc	550 00
Oils, waste, packing, etc	168 94
Small supplies	169 88
Total cost	$8,853 39
Cost of pumping 1,000,000 gallons 100 feet high	$13 03
Average daily pumpage for quarter, U. S. Gallons	7,240,510

Report of High Bridge Pumping Station for Quarter Ending June 30, 1903.

Total number of gallons pumped	397,077,251
Average total lift, dynamic feet	108,80
Gallons pumped 100 feet high	430,649,990
Total pounds of coal burned	972,443
Gallons pumped 100 feet high per pound of coal	442.85
Cost of Pumping—	
Station payroll	$2,286 75
Fuel	2,218 67
Repairs to machinery, etc	550 00
Oils, waste, packing, etc	78 57
Small supplies	69 28
Total cost	$5,203 27
Cost of pumping 1,000,000 gallons 100 feet high	$12 08
Average daily pumpage for quarter, U. S. gallons	4,363,486

DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY—BOROUGH OF MANHATTAN.

Pumping Station No. 1, First Ward.

	1903. First Quarter.	Second Quarter.	Third Quarter.	First Two Months of Last Quarter.
Number of gallons pumped	61,774,086	67,884,491	63,051,898	40,914,195
Total lift in feet, suction and friction included	120.089	110.97	.....	133.48
Number of gallons pumped 100 feet high	74,181,312	75,331,420	79,660,970	54,550,627
Total pounds of coal burned	397,737	346,511	331,258	201,407
Cost of Pumping.				
Station payroll	$1,562 70	$1,672 05	$1,672 05	$1,142 70
Fuel	1,466 59	1,046 50	882 77	536 78
Repairs to engine, pumps, boilers, wells, etc.	163 98	163 98	163 98	109 32
Small supplies	136 41	136 41	136 41	90 94
Oils, waste, packing, etc	48 04	64 63	60 95	38 94
Total cost	$3,377 72	$3,083 57	$2,916 16	$1,918 68
Cost of pumping one million gallons 100 feet high	$45 53	$40 93	$36 60	$35 15

Average quarterly cost of pumping one million gallons 100 feet high, $39.55.
Average daily pumpage for the year, U. S. gallons, 699,475.

Pumping Station No. 3, First Ward.

	1903. First Quarter.	Second Quarter.	Third Quarter.	First Two Months at Last Quarter.
Number of gallons pumped	53,444,095	54,664,838	57,989,207	44,137,248
Total lift in feet, suction and friction included	144.52	135.99	119.523	116.46
Number of gallons pumped 100 feet high	77,205,827	74,284,256	69,369,647	51,415,908
Total pounds of coal burned	247,250	259,830	260,062	177,735
Cost of Pumping.				
Station payroll	$1,672 05	$1,672 05	$1,672 05	$1,142 70
Fuel	911 67	781 14	693 89	473 68
Repairs to engine, pumps, boilers, wells, etc.	132 69	132 69	132 69	88 46
Small supplies	114 27	114 27	114 27	76 18
Oils, waste, packing, etc	59 61	34 03	50 24	36 41
Total cost	$2,890 20	$2,734 18	$2,663 14	$1,817 43
Cost of pumping one million gallons 100 feet high	$37 43	$36 80	$38 39	$35 34

Average quarterly cost of pumping one million gallons 100 feet high, $36.99.
Average daily pumpage for the year, U. S. gallons, 629,447.

Flushing Pumping Station, Third Ward.

	1903. First Quarter.	Second Quarter.	Third Quarter.	First Two Months of Last Quarter.
Number of gallons pumped	88,358,838	88,439,934	88,519,440	58,516,886
Total lift in feet, suction and friction included	.....	204.913	204.123	.....
Number of gallons pumped 100 feet high	174,223,903	181,377,213	180,734,143	115,336,479
Total pounds of coal burned	359,780	346,415	358,573	231,735
Cost of Pumping.				
Station payroll	$1,588 05	$1,588 05	$1,588 05	$1,142 70
Fuel	1,262 41	1,022 17	955 65	617 61
Repairs to engine, pumps, boilers, wells, etc	239 85	239 85	239 85	159 90
Small supplies	109 32	109 32	109 32	72 88
Oils, waste, packing, etc	66 46	98 22	89 29	47 81
Total cost	$3,266 09	$3,057 61	$2,982 16	$2,040 90
Cost of pumping 1,000,000 gallons 100 feet high	$18 74	$16 85	$16 40	$17 00

Average quarterly cost of pumping 1,000,000 gallons 100 feet high, $17.24.
Average daily pumpage for the year, U. S. gallons, 969,566.

Bayside Pumping Station, Third Ward.

	1903. First Quarter.	Second Quarter.	Third Quarter.	First Two Months of Last Quarter.
Number of gallons pumped	115,200,022	119,764,558	123,021,834	85,185,122
Total lift in feet, suction and friction included	201.756	204.41	206.24	208.21
Number of gallons pumped 100 feet high	232,422,956	244,892,608	253,376,780	177,340,155
Total pounds of coal burned	370,410	429,500	380,746	256,350
Cost of Pumping.				
Station payroll	$1,672 05	$1,672 05	$1,672 05	$1,142 70
Fuel	1,154 38	1,201 82	1,014 75	683 21
Repairs to engine, pumps, boilers, wells, etc	349 32	349 32	349 32	232 88
Small supplies	50 79	50 79	50 79	33 86
Oils, waste, packing, etc	84 40	72 45	63 76	46 06
Total cost	$3,310 94	$3,346 43	$3,150 67	$2,137 71
Cost of pumping 1,000,000 gallons 100 feet high	$14 20	$13 66	$12 43	$12 05

Average quarterly cost of pumping 1,000,000 gallons 100 feet, $13.08.
Average daily pumpage for the year, U. S. gallons, 1,326,860.

Whitestone Pumping Station, Third Ward.

	1903. First Quarter.	Second Quarter.	Third Quarter.	First Two Months of Last Quarter.
Number of gallons pumped	18,027,150	8,176,952	6,898,084	4,473,990
Total lift in feet, suction and friction included	171.055	172.21	173.59	.....
Number of gallons pumped 100 feet high	30,883,923	14,157,434	12,128,971	8,048,458
Total pounds of coal burned	137,250	87,226	49,520	64,731
Cost of Pumping.				
Station payroll	$1,243 35	$1,562 70	$1,562 70	$1,069 80
Fuel	403 77	237 83	203 93	172 50
Repairs to engine, pumps, boilers, wells, etc	88 65	88 65	88 65	61 72
Small supplies	117 06	117 06	117 06	81 50
Oils, waste, packing etc	33 57	27 81	14 18	11 67
Total cost	$1,886 40	$2,034 05	$1,986 52	$1,397 19
Cost of pumping 1,000,000 gallons 100 feet high	$61 08	$143 67	$153 78	$173 59

Average quarterly cost of pumping 1,000,000 gallons 100 feet high, $133.03.
Average daily pumpage for the year, U. S. gallons, 112,503.

Borough of Queens—Municipal Plants.

Average daily pumpage for the year, First Ward, U. S. gallons	1,328,922
Average daily pumpage for the year, Third Ward, U. S. gallons	2,408,929
Total average daily pumpage for the year for the borough, U. S. gallons	3,737,851

N. S. HILL, Jr., Esq., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I respectfully submit the following reports of the work done in 1903, and condition of the reservoirs, lakes and streams in the watershed of the Croton, East Branch, West Branch, Middle Branch, Muscoot river, Bronx, Byram and Wampus rivers, supplying The City of New York with pure and wholesome water, and the efforts made by the Sanitary Engineer to improve and retain the purity of the waters and keep them in a sanitary condition.

I wish to acknowledge the courtesy and assistance received from and the faithful attention to duty of the Assistant Engineers, Superintendents, Keepers, Foremen and others under me.

Respectfully yours,
(Signed) JOHN E. McKAY,
Principal Assistant Engineer.

December, 1903.

Annual Report for the Repairs and Maintenance of the Aqueducts, 1903.

Mr. N. S. HILL, Jr., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I respectfully submit the following report of work done and material used along the lines of the new and old aqueducts, Croton lake, reservoirs and streams in Westchester County. The sanitary condition of the water supplied to the City has been kept in as pure and wholesome a condition as possible.

First Division—The work performed on this division has been concrete work on apron of dam, clearing driftwood from lake, repairing in gate houses, cleaning floors and gratings in gate houses, cutting grass, making sanitary inspections of

streams emptying into the lake, building and repairing walls, fences, roads, etc., and cleaning up line of aqueduct.

Second Division—The work performed on this division has been tearing down and rebuilding head-house on the New Aqueduct at Shaft No. 5, because of the very bad condition it was in, building and repairing fences and roads, painting fences, cutting grass and keeping the line cleaned up generally.

Third Division—The work performed on this division has been that of building and repairing of walls, roads and fences, painting fences and buildings, hauling lumber and posts for fences and stone for walls, hauling manure, cutting grass and cleaning up line.

Fourth Division—The work performed on this division has been building retaining walls, repairing aqueduct banks where washed out and damaged by storms, excavating, filling and grading, building, repairing and painting fences, hauling stone, cleaning crosswalks, drains and gutters, and keeping line in good shape.

Fifth Division—The work performed on this division has been cleaning the machinery at Dunwood, cleaning and overhauling Old Aqueduct gate-house, building, tearing down and rebuilding drystone walls, building, rebuilding and painting fences, painting Keeper's house and sheds at Dunwood, also iron flooring in gate-house, cutting grass, clearing ice, snow and rubbish from walks, culverts and gutters, and all other necessary things to keep line in good order.

Sixth Division—The work performed on this division has been repairing roadways, excavating, filling and grading, cleaning machinery in gate-house, cleaning around head-houses on New Aqueduct, building, repairing and painting fences, painting Keeper's house, clearing snow and dirt from culverts and crossings after each storm, repairing roof on barn, whitewashing sheds, rebuilding culverts and sidewalks, setting telephone poles, and keeping line thoroughly cleaned.

Seventh Division—The work performed on this division has been cutting grass, cleaning culverts, drains and walks, also High Bridge and steps leading to it, from snow and ice, reservoir cleaned and banks scrubbed, cleaning tower and gate-house, hoisting coal and hauling ashes, repairing walls, building and repairing fences, painting in pumping station, repairing lagging on pumps, and keeping line clean.

Eighth Division—The work performed on this division has been cleaning and painting screws at One Hundred and Thirty-fifth street gate-house, repairing lagging on pumps at Ninety-eighth street station, keeping surface of water clean in the reservoirs, repairing reservoir banks, repairing fences and setting fenceposts, painting One Hundred and Thirteenth street and One Hundred and Thirty-fifth street gate-houses, cleaning screws at gate-houses, pointing ends of coal-house at Ninety-sixth street, setting coping and pointing brick wall, building pump room and foundation for pumps in Ninety-eighth street station, painting standpipe at Ninety-eighth street, putting new roof on pump room at Ninety-eighth street, patroling Central Park reservoirs, cutting grass on reservoir banks, etc.

Respectfully submitted,

(Signed) JOHN E. McKAY,

December, 1903. Principal Assistant Engineer.

Summary of Annual Report for Aqueduct Repairs and Maintenance, 1903.

Division.	Drystone Masonry, Cubic Yards.	Rubble Masonry, Cubic Yards.	Brick Masonry, Cubic Yards.	Concrete Masonry, Cubic Yards.
No. 1	3	..	..	22
No. 2	12	17	7	20
No. 3	183	..	..	..
No. 4	71	..	..	..
No. 5	35	..	..	..
No. 6	25	..	..	..
No. 7	2	..	..	..
No. 8	..	..	102	..
Total	331	17	109	44

Division.	Cement Masonry, Cubic Yards.	Pointing Masonry, Square Yards.	Earth Excavation, Cubic Yards.	Filling and Grading, Cubic Yards.
No. 1	..	..	..	92
No. 2	31	..	17	79
No. 3	..	..	..	89
No. 4	..	..	..	244
No. 5	..	..	..	199
No. 6	..	..	..	335
No. 7	..	..	..	..
No. 8	..	35	..	..
Total	31	35	17	1,038

Division.	Building Stone Hauled, Loads.	Earth Hauled, Loads.	Concrete Walk Laid, Square Yards.	Flagging Laid, Square Feet.
No. 1	..	..	..	..
No. 2	..	..	..	..
No. 3	80	..	2	..
No. 4	380	55	..	..
No. 5	27	..	..	492
No. 6	..	..	..	..
No. 7	..	..	..	..
No. 8	..	..	..	..
Total	487	55	2	492

Division.	Flagging Relaid, Square Feet.	Fence Built, Linear Feet.	Fence Repaired, Linear Feet.	Fence Painted, Linear Feet.
No. 1	....	....	....	....
No. 2	....	4,583	108	3,150
No. 3	....	3,106	1,160	4,198
No. 4	....	1,836	1,880	2,356
No. 5	1,947	4,931	1,770	2,403
No. 6	....	3,322	4,000	3,822
No. 7	....	520	....	....
No. 8	....	....	....	....
Total	1,947	18,298	8,918	15,929

Division.	Fence Posts Set.	Seeding and Sodding, Square Yards.	Buildings Painted.	Manure Hauled, Loads.
No. 1	..	..	..	..
No. 2	894	..	..	..
No. 3	540	..	2	30
No. 4	..	..	..	..
No. 5	100	171	..	..
No. 6	290	..	5	..
No. 7	70	..	..	..
No. 8	9	..	3	..
Total	1,903	171	10	30

N. S. HILL, Jr., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I submit the report of Mr. Thurston C. Culyer, Assistant Engineer and Superintendent of the work done in the Westchester County Division of the Croton Watershed for the past year 1903.

The lands around the reservoir have been given proper attention and thoroughly cleaned; the brush, etc., along the highways on City property have been cut and burned. All the iron work in the gate-house at Titicus and Muscoot dams has been cleaned and painted. A new cement roof put on the Titicus gate-house, and where needed the stone work repainted.

The fences around the reservoirs have been kept in as good condition as possible, but many new posts and rails are needed to replace the old ones.

All the buildings on the property of formerly St. Joseph's College have been torn down and the wood work burned. The college authorities are now engaged in removing the bodies from the cemetery on this property.

The reservoirs and streams have been regularly patroled, and all nuisances promptly reported and abated. Water samples from the reservoirs and rivers have been collected weekly and sent to the laboratory. All boating and fishing on reservoirs, lakes and streams has been stopped for sanitary reasons.

Respectfully,

(Signed) JOHN E. McKAY,

December, 1903. Principal Assistant Engineer.

Mr. N. S. HILL, Jr., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I submit the following report of Mr. Thomas Manning, Leveller and Superintendent of Putnam County District:

A general oversight of this portion of the water-sheds has been maintained by the men employed on work throughout the river valleys and along lake shores, in addition to the care given to the reservoir basins by the men detailed at the reservoir dams.

The houses and barns for use of the employees at the several dams have been kept in good order.

Middle Branch Reservoir—The embankment slope mowed and kept free of weeds. The tunnel cleaned and all iron work scraped and painted, stopcocks cleaned and painted, screws cleaned and greased. Iron highway bridge at Tilly Foster painted; weeds and brush along highways bordering on reservoir property cut and burned. Road culverts and wooden bridges repaired, stone fences repaired and brush on all land between high water and fence wall around Middle Branch Reservoir cut and burned.

Flash boards 12 inches high were erected on lip of the spillway. (By contract.)

Boyd's Corners Reservoir and Dam—Brush and weeds on highway around the reservoir cut and burned, and on cleared portion of reservoir lands brush, etc., cut. The stopcocks and vaults cleaned. The property in front of the dam and around keeper's house has been kept neat and in good order.

West Branch Reservoir—Post and rail fence along highway repaired. Three (3) miles of stone fence wall repaired. Slope paving at main and auxiliary dams repaired. Macadmam road across auxiliary dams repaired; edges of embankment along the road trimmed; slope paving at toe of embankment cleaned; paved ditches cleaned and repaired. Gate-house roofs repaired and painted twice—all gates, stopcocks and iron work in gate-houses cleaned and painted. Embankments mowed and kept free from weeds. All weeds on land along shore of reservoir near woods and along road sides cut and burned.

Flash boards two feet high were erected on the lip of West Brank Reservoir Dam and water filled to top. The flash boards have been taken off and stored for the winter.

West Branch—Middle Branch Croton river, Baker's brook and Michael's brook, from West Branch Reservoir and Middle Branch Reservoir to the Westchester

County line. All brush, weeds and fallen trees have been cut. All roadsides through this property have been cleared of brush and weeds.

Barrett Pond—Gate at Barrett pond in good order. Channel and banks of stream cleared of brush and weeds.

Lake Gleneida—The property around Gleneida has been kept clear of weeds and brush. Fences maintained in good order. Flume and outlet channel walls have had needed repairs and are in good order.

White Pond Reservoir—The White Pond Dam, channel walls, paving and fence walls have been maintained in good order. The land owned by the City around White Pond Reservoir and along outlet of same has been kept clear of brush, weeds, etc.

Lake Gilead—The masonry flume at Gilead has been maintained in good order. Channel kept clear, brush cut and burned.

Mahopac Village, Cranberry Pond and Outlet—Destroyed houses, barns, privys and other buildings on twenty parcels at Mahopac Village. Cleaned out all privy vaults, house drains, cesspools, etc., filled wells, cisterns and privy vaults with lime and fresh earth. Cleared up and cleaned out the Village brook for a distance of two thousand (2,000) feet. Cleaned out the outlet of Cranberry pond, from pond down the stream, one mile. Cut all weeds, brush, etc., on City property from Cranberry pond to Baker's brook (about five miles). The contract for fencing this property is progressing slowly.

Moscoot River, Below Mahopac Falls to Westchester County Line, 3 1-2 Miles—Cut and burned all brush, weeds and old trees, driftwood, etc., for a width of 25 feet each side of stream. Removed stumps, logs, etc., dug out all sand bars and straightened river channel in many places. Cleaned up Hazelton brook for 400 feet, weeds, brush cut and burned. Cleaned out Outlet Secord pond, from Dean's bridge to junction with Muscoot river. Erected 700 feet guard rail and property fence at the Stillwater Bridge. Cut all weeds and brush on highways through City property on Muscoot river lands. Dug 200 test pits at Mahopac Falls on site of proposed filter plant. Destroyed all vacated houses and outbuildings on property acquired under Muscoot proceedings. Cleaned out drains, privy vaults, etc. Took down two barns to get lumber for use at electrozone plant at Brewsters.

Mahopac Lake, Outlet Channel—Took down and relaid 400 feet channel wall. Relaid 300 feet retaining wall along highway. Built 160 feet guard rail on top of retaining wall, reset coping and repaired side walls of channel where necessary from lake to Mahopac Falls. Filled in with earth all washouts behind wall. Cleaned bottom of channel from lake to Mahopac Falls. Set new property monuments on City land along outlet.

Kirk Lake, Outlet and Farm Lands—Relaid stone fence from lake to entrance gate 1,100 feet. Relaid stone fence on south and east side of Kirk farm. Built 200 feet fence wall across railroad embankments. Cleaned the paving in bottom of channel and carted material away. Built new road at entrance to Kirk lake. Built two stone culverts. Dug 400 feet of protection ditch (keeps upland drainage from dry walls at dam). Repaired dam. Excavated 100 cubic yards cement masonry. Built 14 cubic yards dry masonry. Refilled about 75 yards earth. Riprapped the wings to approach to overflow, 100 cubic yards. Built 300 feet wire and post fence, property line.

Electrozone Plant, Brewsters, N. Y.—During the summer one new tank put in place of old one and one additional tank erected. Dynamos repaired, new switchboard put in, new connections made. The plant now has double its original capacity. Operated by one machine. During the past six months samples of water have been taken weekly from all the lakes, reservoirs and rivers by the men employed by this Department and sent to Katonah and Brooklyn. Men have been detailed regularly to patrol the streams in this part of the watershed.

I submit the following report of the work done around the East Branch reservoirs and streams during the year 1903. Cutting bushes and weeds on the lands, repairs to fence walls and fences, operating the gates to control water in reservoirs, cleaning the draining pipes, cutting down and removing trees and bushes and burning same. Cleaning, greasing and oiling stopcocks and screens and working same. Painting iron work to gate house and cleaning the houses. Carting salt to the electrozone plant. Taking samples of water to be analyzed. Opening and cleaning ditches, tiles and vaults of the electrozone plant, which treats the sewage of Brewsters. Removing snow and obstructions.

The work under contract for raising spillway of Sodom Dam, paving channelways and raising walls of same; also raising roads around reservoirs and building stone fence walls, has been carried on by the contractor with reasonable rapidity and is progressing favorably.

Respectfully yours,

(Signed) JOHN E. McKAY,

December, 1903. Principal Assistant Engineer.

Mr. N. S. HILL, Jr., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I submit the report of Mr. Matthew Betts, Assistant Engineer and Superintendent, Bronx River District, of the operations of the men employed around Kensico reservoir, Rye ponds, Bronx and Byram river watersheds, and the sanitary precautions taken to maintain the purity of the Bronx and Byram watersheds of the water supplied to The City of New York.

Repairs where needed have been made to fences, retaining walls and riprapping around reservoirs, lakes and streams. The force employed on maintenance and repairs of Bronx river works, in addition to usual labor on repairs, have been engaged during the past year in greatly extending the width of the clearing along the streams and around the reservoir by cutting bushes and weeds and removing from the surface much deleterious matter.

The channels of the Byram and Wampus rivers have been cleared, cleaned and improved for a distance of 13,000 feet.

The channel of Branch brook has been widened, deepened and straightened for a distance of about 4,000 feet, and much cleaning of the surface and removing bushes and trees along this stream and Kisco river.

About forty buildings condemned for sanitary purposes by the Commission appointed were torn down, and ground leveled and cleaned up on outlet of Rye ponds, Bronx, Byram and Wampus rivers. Two filters have been constructed for the purification of surface drainage at Mount Kisco.

Respectfully,

(Signed) JOHN E. McKAY,

December, 1903. Principal Assistant Engineer.

Mr. N. S. HILL, Jr., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I submit the report of the Sanitary Engineer, Mr. Fred K. Betts, of the work he has done to maintain the purity of the water supplied to the City in all watersheds, reservoirs, etc., during the quarter ending September 30, 1903.

Four hundred and nineteen nuisances have been reported to and examined by this office, and that (316) notices to abate have been served on parties maintaining same.

During the same period 166 abatements have been secured, and 143 nuisances have been examined by the State Board of Health.

Yours respectfully,

(Signed) JOHN E. McKAY,

December, 1903. Principal Assistant Engineer.

Report of Sanitary Patrol for 1903.

Mr. N. S. HILL, Jr., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I have the honor to report that during the year a complete sanitary survey has been made of The Bronx, Byram and Croton watersheds, with the exception of a small area in the northeasterly portion of the Croton. The Village of Lake Mahopac, in the Croton watershed, is the only village that has been completely surveyed. An instrumental survey and maps have been made of Brewsters, but the sanitary work has not yet been completed. The number of nuisances located, described and reported to the Board of Health is 419. These are scattered all over the watersheds mentioned, and the State Board of Health has been appealed to to secure abatements of same. 166 abatements have been secured, most of these having been made by the parties maintaining nuisances, without recourse to law. It has been decided that the City shall build and maintain plants for the disposal of the sewage of villages in the Croton watershed, as this is the only way in which a satisfactory degree of purification can be at all times secured. Plans have already been made for a disposal plant for the Village of Mt. Kisco, and await the acceptance of the State Board of Health. At this place a filter has been put in to purify a small stream that drains about ten or a dozen acres in the heart of the village, and received the entire waste from nineteen houses, barns, etc. This filter has been in operation but three weeks and shows an efficiency of 80 per cent. In connection with the Office of Sanitary Patrol at Katonah a bacteriological laboratory has been built and thoroughly equipped, and weekly samples taken from all of the lakes, reservoirs and large streams of the Croton and Bronx water systems are tested. By this means any variation from the standard of purity will be quickly detected and the cause of same found and removed. When the disposal plants above mentioned have been established, this laboratory will be of vital importance, as with such plants, in order to maintain a high degree of purification, the quality of the effluent must at all times be known. In summing up the work of the Sanitary Patrol, it should be taken into consideration that the office has been but newly established and methods of inspection and record had to be devised and put in operation; also that the residents of the watersheds have not as yet fully realized that the City can and will enforce the rules and regulations passed by the Legislature for the protection of the health of its citizens.

(Signed) FRED. K. BETTS,
Assistant Engineer in Charge.

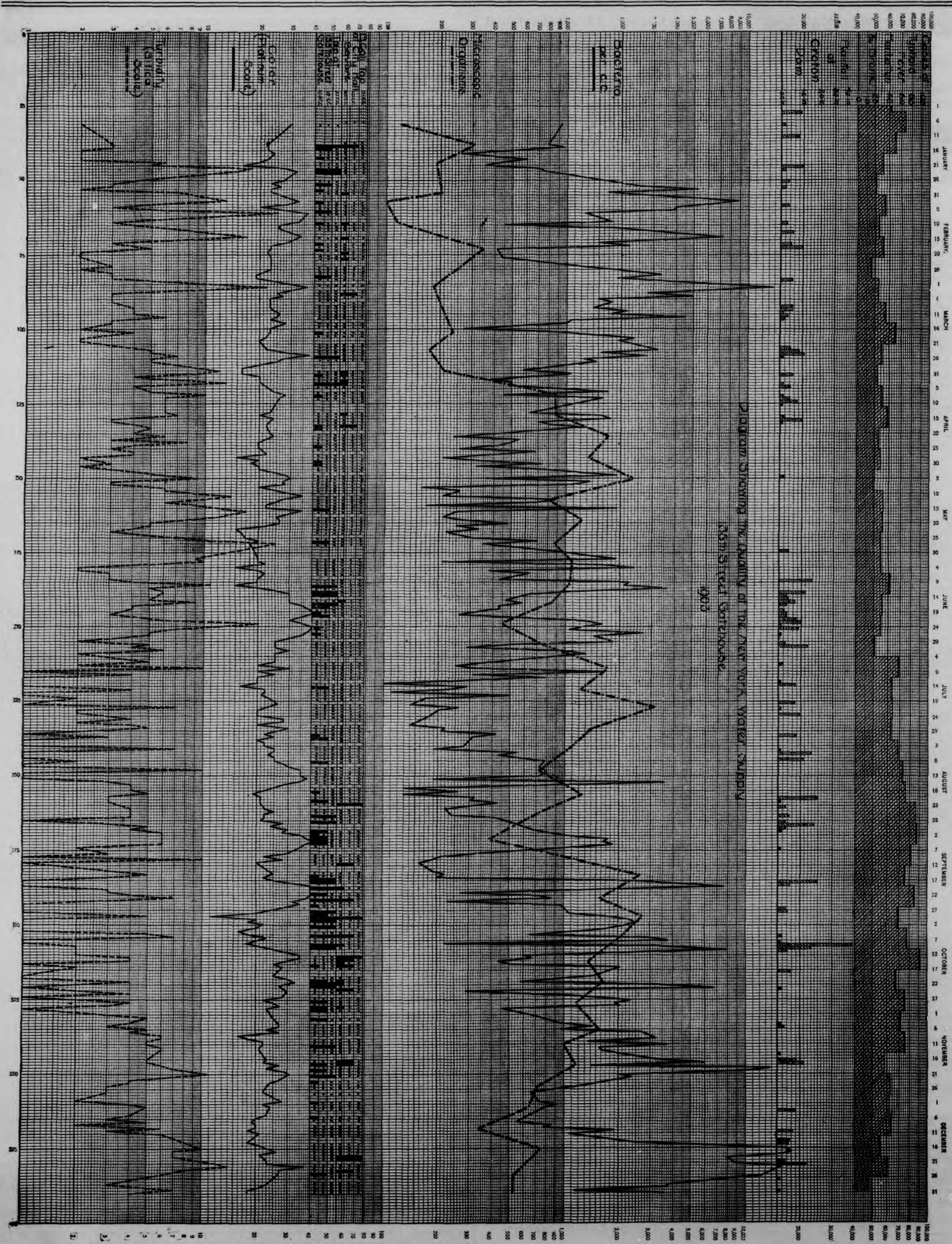
Quality of Croton Water.

The Croton water as delivered to the consumers may be characterized as safe from a sanitary standpoint, noticeably colored and slightly turbid, with an odor usually vegetable, but occasionally aromatic, grassy or fishy. It is a good boiler water and generally satisfactory for industrial purposes. The chief complaints that have been made against the water have been due to its physical qualities, such as turbidity, color and odor. The turbidity of the water represented by the samples collected at the One Hundred and Thirty-fifth Street Gate House has varied more or less from day to day. Sometimes being as low as 1 on the silica scale, and at other times running as high as 25. The average turbidity from January to September, 1903, was 5. By the time the water reaches City Hall square the turbidity has been reduced to an average of about 3. The color of the water has ranged from 16 to 30 on the platinum scale and averaged about 24. When the color is much higher than 20, it becomes noticeable to the consumer. The odor of the water has not been as bad during the present season as it has been sometimes in the past. The water always has a slight vegetable taste and odor, due to the presence of the same substances which give the water its color. At other times, and especially during the summer, it has an odor variously described as aromatic, grassy or fishy, due to the presence of microscopic organisms. These organisms are found in nearly all of the storage reservoirs, but it is in those reservoirs recently constructed that the growths attain their greatest development. This may be seen from the following table:

Microscopic Organisms—(Average Number of Standard Units per c. c.)—1903.

Reservoir.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Sodom	....	145	177	481	1,095	899	804	2,019	973	1,139	1,339
Bog Brook	....	483	317	1,406	1,703	783	359	448	855	3,000	2,326
Middle Branch	....	443	414	3,748	1,366	292	948	584	550	1,133	974
Boyd's Corner	....	125	86	526	661	196	208	234	283	91	231
West Branch	....	667	714	1,418	1,045	484	893	330	304	521	637
Lake Gleneida	....	117	106	446	214	35	26	105	72	54	40
Lake Gilead	....	49	90	76	46	80	41	19	17	94	75
Lake Mahopac	....	695	446	1,235	313	88	40	95	148	389	1,109
Kirk Lake	....	658	464	2,315	341	242	149	450	612	1,183	496
Muscoot	....	895	471	1,258	1,186	617	215	925	1,517	3,080	2,388
Titicus	....	593	474	938	954	596	1,345	340	203	433	571
Croton Lake	....	290	279	1,207	753	434	1,498	448	488	1,165	663
One Hundred and Thirty-fifth Street Gate House	206	205	202	1,206	1,300	844	1,855	945	1,701	1,571	1,116
Central Park, New	236	222	271	1,066	800	966	1,411	2,855	2,229	1,321	1,185
Central Park, Old, North Basin	242	327	1,110	1,652	3,496	1,870	4,675	2,795	5,290	1,746	2,993
Central Park, Old, South Basin	329	251	428	1,025	2,574	1,283	2,445	3,021	2,672	1,668	1,489
Tap at City Hall Square	155	285	219	739	815	882	1,445	1,186	933	1,247	1,067

At times the water as it leaves the Aqueduct at the One Hundred and Thirty-fifth Street Gate House has an odor which can be definitely traced to these organisms, but it is in the reservoirs at Central Park that the disagreeable odors are chiefly acquired. This fact is very evident from the above table, but may be observed more readily by comparing the figures for the month of September alone. During that month the water, as it left the Aqueduct at the One Hundred and Thirty-fifth Street Gate House, contained only 1,700 microscopic organisms per cubic centimeter, while the water at the outlets of the reservoirs in Central Park contained from 2,229 to 5,290 per cubic centimeter. During the passage of the water through the distribution pipes many of the organisms are destroyed, so that during September the average number at City Hall square was only 933. The most important organisms present at that time were Anabena and Aphanizonemon, organisms which give rise to a grassy and moldy odor. The present season, however, has not been favorable for the development of troublesome microscopic organisms, so that the odor of the water in the City has been rather better than usual. The sanitary character of the water is best shown from the analytical results by the number of bacteria per cubic centimeter and the presence of bacillus coli, the intestinal germ. The average number of bacteria in the tap water in City Hall square from January 1 to December 31 was 585, but the numbers vary at different times from 80 to 7,000 per cubic centimeter. The large numbers have occurred after heavy rains, and are unquestionably caused by the surface wash on the watershed. The test for bacillus coli has been made upon three different quantities of water, and the results for the first nine months of the year were as follows: One per cent. of the samples gave positive tests when tested with one-tenth of a cubic centimeter; 3½ per cent. with 1 centimeter, and 9 per cent. with 10 cubic centimeters.



By means of the accompanying diagram the daily fluctuations in the physical character and in the sanitary quality of the Croton water as it enters the City, together with the daily fluctuations in the turbidity and color of the water, the number of bacteria and the presence or absence of B. coli can be seen at a glance. The diagram also shows the rainfall and the number of cases of typhoid fever, as given in the weekly reports of the Department of Health. It will be seen that the fluctuations in turbidity usually follow the rainfall; that the bacteria are high in winter and low in summer; that the microscopic growths are low in winter and high in summer. It is evident from these observations, and similar ones made upon other waters, that the available organic food in the water is to a large extent used up by the bacteria in winter and the microscopic growths in summer.

The most interesting and instructive part of this diagram will be found in the absolute lack of relationship between the presence of B. coli in the water and the typhoid morbidity rate in Manhattan. If there was any connection between the quality of the water as shown by the presence of B. coli, the rise in the typhoid morbidity would occur about two weeks after the presence of abundant growths of B. coli. It will be found from an inspection of the diagram that this is absolutely the reverse in the case of the Croton water, and that during the year 1903 it may be said with a fair degree of certainty that no cases of typhoid in Manhattan were produced from the water supply.

The quality of the water supplied to the Borough of The Bronx has been generally satisfactory. The supply is naturally slightly better than that of the Croton water. During the present year no extensive growths of organisms in Williamsbridge Reservoir have appeared. The various water supplies of the Borough of Queens are chiefly taken from underground sources, and from the sanitary standpoint the analyses show them all to be satisfactory. Some of these waters, however, are very hard and are unsatisfactory in many ways for boiler uses and general industrial purposes. The supplies in this borough have not differed materially from past years. In this borough the analytical results cover a period of several years, so that there is opportunity for making exact comparisons. The water supplies in the Borough of Richmond have been given particular attention. They are all derived from underground sources and may all be considered as satisfactory from a sanitary standpoint. The

waters are all hard, however, and that supplied by the Staten Island Water Supply Company is not only very hard, but contains a large amount of salt and a considerable amount of iron in solution. These qualities quite unfit it for the general uses of a public water supply. The iron precipitates from the water on standing and is likely to cause trouble in the laundry by depositing iron rust on the clothes; and the large amount of chlorine present makes the water most unsatisfactory for boiler uses. Personal inspections have been made of all the Staten Island water supplies during the past year.

A summary of the results of analyses is given in the accompanying tables, from which the relative qualities of the different sources of supply may be seen.

Special Investigations.

During the past year a number of special problems have been studied on the Croton watershed, among which may be mentioned the following:

On April 16 and 17 a test of the operation of the electrozone plant at Brewster was made to determine whether or not it was effectively purifying the sewage of the Town of Brewster. The results were incorporated in a special report presented to you at that time. They appeared to corroborate tests which were made a number of years ago by the Department of Health, which showed that the sewage was being effectively disinfected by the application of the electrozone. Samples of sewage taken after treatment showed it to be almost, but not quite, sterile. On allowing this treated sewage to stand in the laboratory, however, a secondary decomposition took place. Samples of mud taken from the tiled drains at the lower end of this City were tested for bacillus coli and, in every case, gave negative results.

A special investigation was made to determine the efficiency of the sewage disposal plant at the Montefiore Home for Consumptives in Bedford. These results were not wholly favorable to the system and, in view of the importance of the subject, it will probably be necessary to collect samples regularly from the stream into which the sewage effluent indirectly finds its way.

Several series of analyses have been made to determine the character of the water in Lake Mahopac with reference to its sanitary quality and the possibility of its being filtered to remove the effects of pollution. Inspection of available filter sites were also made and many samples of local deposits of sand analyzed mechanically, in order to determine their fitness for filtration purposes.

A number of samples have been collected from the region above the Sodom Reservoir, in order to determine the effect upon the quality of the water of the swamps in that locality and to ascertain the effects of the limestone deposits in the same region. A series of samples has also been collected from the streams and brooks below the village of Mt. Kisco, where the sources of pollution are probably more serious than elsewhere on the watershed.

The statistical studies have also been made to show the density of population on the watershed above the various sources of supply. The results show that, taken as a whole, the population over the watershed is about 52 persons per square mile, but it varies in different sections from 27 to 390 per square mile, being generally lowest in the upper portions of the watershed and highest in those portions nearest the city. On the watershed of the Bronx and Byram system the population is about 34 per square mile. Comparison of existing populations with those given in previous census reports shows that, taken as a whole, the population on the watersheds are not increasing, but have, in fact, diminished during the last ten or twenty years. This has been due in great measure no doubt to the extensive purchase of property by the City for the protection of the supply. Whether or not additional purchases should be made, however, or whether in the future reliance should be placed upon the filtration of the water are questions which must be decided according to local conditions.

Improvement of the Quality of Croton Water.

In order that the citizens of New York may be furnished with a more satisfactory supply the most imperative need at the present time is that of cleaning the reservoirs in Central Park. Organic matter has been accumulating in these reservoirs for many years, with the result that they have now become thoroughly seeded with the growths of microscopic organisms, and there is nothing to prevent these growths from occurring year after year. The removal of the spore-laden mud would be an efficient means of improving the quality of the water.

Another means of preventing objectionable microscopic growths in the supply and the removal of the occasional disagreeable tastes and odors which they produce, would be brought about by a system of by-passes for the Central Park Reservoirs, similar in construction to those now in use in the Ridgewood Reservoirs of the Brooklyn supply. By means of these by-passes one or more of the reservoirs may be temporarily shut off, and the water conducted around the reservoir instead of through it. In these isolated reservoirs the quiesence of the water and the lack of fresh supplies of food usually tend to cause a settling out of the microscopic growths, and in the course of ten days or two weeks the water may be again put into service. It is seldom that more than one reservoir at a time contains large numbers of these odor-producing organisms, so that by means of this system the quality of the water supplied to the consumer may be greatly improved. In distributing systems where such methods are employed, it has been found that not only is temporary improvement brought about, but that the microscopic growths occur from year to year in very much less quantities than before the system was put in practice. This is probably due to the fact that the spores or seeds produced by these growths do not have an opportunity for such enormous development as they do in reservoirs which are continually in use.

Respectfully submitted,

G. C. WHIPPLE, Biologist in Charge.
D. D. JACKSON, Chief Chemist.

Annual Report Mount Prospect Laboratory for 1903.

Mr. NICHOLAS S. HILL, Chief Engineer, Department of Water Supply, Gas and Electricity:

Dear Sir—The following report of work done in connection with the sanitary supervision of the water supplies of the boroughs of Manhattan, The Bronx, Queens and Richmond during the year 1903, is respectfully submitted.

Until the summer of 1902 no systematic analyses of the water supplies of the Borough of Manhattan had been made by this Department. At that time the work was begun under the direction of the Hon. J. Hampden Dougherty, then Commissioner of Water Supply, Gas and Electricity, but it was confined to the distribution system and did not cover the sources of supply. During the first year all the work was done at Mount Prospect Laboratory, in Brooklyn. In January of the present year Commissioner Robert Grier Monroe directed that the scope of this laboratory should be extended to cover all the water supplies of New York City, and also the investigations which were about to be made by the Commission on Additional Water Supply. This increased work necessitated the enlargement of the present laboratory, and the construction of a branch laboratory on the Croton Watershed. This last was rendered necessary by the fact that it was impossible to transmit samples from the various reservoirs of the Croton system to the Mount Prospect Laboratory, in Brooklyn, in time to secure a satisfactory bacteriological examination. In connection with the work of the Additional Supply a second branch laboratory was temporarily located at Poughkeepsie, New York. The present report, however, will include only the work done for the present City supply, except that for the Borough of Brooklyn.

In addition to the regular work of water analysis, frequent tests of coal, lubricating oil, boiler scales, bronze castings, etc., have been made for the Department.

Amount of Work Done.

The following figures will serve to give an idea of the amount of work which has been done in Mount Prospect, Katonah and Poughkeepsie Laboratories from January 1 to December 31, 1903:

Physical examinations	16,018
Complete chemical analyses	1,428
Partial chemical analyses	7,734
Microscopical examinations	3,055
Bacteriological examinations	6,172
Bacteriological tests for bacillus coli	4,674
Borough of Brooklyn	4,779
Borough of Manhattan	2,870
Borough of Queens	162
Borough of The Bronx	155
Borough of Richmond	112
Commission on Additional Water Supply	9,945
Total number of samples	18,023

Water Analyses.

The schedule for the collection of samples for analysis has been practically as follows:

Daily samples have been collected from the terminus of the Croton Aqueduct at the One Hundred and Thirty-fifth street gate house and at a tap in City Hall square. These samples have been analyzed physically and bacteriologically. Chemical and microscopical analyses have also been made upon weekly samples collected from the outlets of the distribution reservoirs in Central Park, from the Williamsbridge Reservoir, and from the One Hundred and Thirty-fifth Street Gate House and the tap in City Hall square. All of the above samples have been sent to Mount Prospect Laboratory in Brooklyn. Weekly samples have been collected from all the storage reservoirs on the Croton Watershed, from a number of places on the Croton river and its tributaries, and from the reservoirs of The Bronx and Byram systems. These samples have been sent to the branch laboratory at Katonah and examined bacteriologically and microscopically. Once a month samples from these reservoirs have been sent to Mount Prospect Laboratory for chemical analysis. In the case of all the storage reservoirs the samples were collected both at the surface and at the bottom near the effluent gate house. In the case of the ground water supplies in the boroughs of Queens and Richmond samples have been collected as often as once a month or once a quarter, as occasion seemed to require it, and given a complete sanitary analysis at Mount Prospect Laboratory.

In deciding upon the above schedule it was the intention to analyze samples from each source with sufficient frequency to detect the ordinary changes in the quality of the water. The water at the lower end of the Croton Aqueduct was found to vary in quality from day to day, while the ground water supplies remain almost constant in quality for long periods of time.

Reports.

The results of all analyses are kept on file at Mount Prospect Laboratory and a duplicate file of these analyses is being prepared for your office.

The results of analyses which relate to the distribution system of Manhattan are summarized in the weekly report, of which the following is a fac-simile:

CITY OF NEW YORK—DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY.

Weekly Report of Katonah Laboratory.

NICHOLAS S. HILL, Jr., Chief Engineer:

Dear Sir—I have the honor to submit the following report on the condition of the water on the watersheds of the Croton, Byram and Bronx rivers, during the week ending September 5, 1903, prepared by Luther R. Sawin.

DANIEL D. JACKSON, Chief Chemist.

WEEKLY REPORT—KATONAH LABORATORY.

No. 9.

Week Ending September 5, 1903.

SAMPLE		PHYSICAL EXAMINATION				BACTERIOLOGICAL EXAMINATION					MICROSCOPICAL EXAMINATION			
DATE	LOCATION	Temperature (Fahr)	Turbidity	COLOR	ODOR	Number of Bacteria per c.c.	Test for B. Coli in 0.1 c.c.	Test for B. Coli in 1.0 c.c.	Test for B. Coli in 10.0 c.c.	Microscopic Organisms. Standard Units per c.c.	IMPORTANT GENERA			
Aug. 31	Sodom Reservoir										Diat.		Cyan.	Protoz.
"	Surface	66.0°	3	35	2v + 1g	150	0	0	0	715	375		315	25
"	Bottom	64.0°	3	47	2v					385	310		75	
31	Bog Brook Reservoir										Diat.	Cyan.	Protoz.	Rot.
	Surface	66.0°	2	19	2v + 1g	—	0	0	0	255	5	240	10	
	Bottom	68.0°	2	24	2v + 1e					420	120	230	45	25
Sept.	Middle Branch Reservoir										Diat.	Chloro.	Cyan.	Protoz.
1	Surface	68.0°	3	19	2v + 1g	80	0	—	+	725	65	30	580	50
"	Bottom	65.0°	4	24	1v + 1e					875	90	50	690	45
1	White Lake										Diat.	Chloro.	Protoz.	Cyan.
	Surface	66.0°	3	19	2v	—	—	—	—	120	35	10	25	50
	Bottom	65.0°	3	22	2v					110	55	20	20	15

DATE	LOCATION	Temperature (Fahr)	Turbidity	COLOR	ODOR	Number of Bacteria per c.c.	Test for B. Coli in 0.1 c.c.	Test for B. Coli in 1.0 c.c.	Test for B. Coli in 10.0 c.c.	Microscopic Organisms. Standard Units per c.c.	IMPORTANT GENERA				
1	Boyd's Corner Reservoir										Diat.	Chloro.	Cyan.	Protoz.	
	Surface	70.0°	2	37	2v	73	0	0	0	295	80	50	115	50	
	Bottom	58.0°	2	33	2v + 1e					170	80	15	55	20	
2	West Branch Reservoir										Diat.	Chloro.	Cyan.	Protoz.	
	Surface	72.5°	3	19	2v + 1e	20	0	0	0	235	25	35	155	20	
	Bottom	68.0°	3	22	1e					350	90		235	25	
2	Lake Gleneida										Diat.		Cyan.	Protoz.	
	Surface	73.5°	3	9	1v	55	0	0	0	95	15		20	10	
	Bottom														
2	Lake Gilead										Diat.				
	Surface	68.0°	1	7	1v	16	0	0	+	5	5				
	Bottom														
2	Lake Mahopac										Diat.	Chloro.	Cyan.		
	Surface	70.0°	1	10	2v	22	0	0	0	205	50	20	135		
	Bottom	68.0°	2	10	2v					130			130		
2	Kirk Lake										Diat.	Chloro.	Cyan.	Protoz.	Rot.
	Surface	70.0°	3	27	2v + 1g	75	0	0	0	960		30	835	45	50
	Bottom	65.0°	3	34	2v					285	25		225	15	20
1	Muscoot Reservoir										Diat.	Chloro.	Cyan.	Protoz.	
	Surface	68.5°	2	22	2v	180	0	0	0	820	40	20	700	60	
	Bottom	52.0°	3	180	2v + 1m					90			80	10	
Sept. 1	Titicus Reservoir										Diat.	Chloro.	Cyan.	Rot.	
	Surface	64.0°	2	22	2v					400	110	20	220	50	
Aug. 31	Bottom	51.0°	10	90	1d					110	55		55		
	Tonetta Brook	50.0°	2	90	2v	1400	+	+	+	70			50	20	
"	Croton River, East Branch										Diat.		Cyan.	Protoz.	
31	Above Tonetta Brook	61.0°	2	35	2v + 1m	510	0	0	0	565	25		495	45	
"	Below Tonetta Brook	60.0°	3	53	2v	520	0	+	+	360	65		220	75	
Sept. 1	Above Purdy's	61.0°	—	39	2v	1860	0	0	0	160	90		60	15	
"	Cross River, at										Diat.	Chloro.			
1	Katonah	64.0°	2	45	1v	515	0	0	0	25	5	20			
2	Branch Brook below Mr. Kisco	—	2	43	2v					25	Diat. 25				
	Croton Lake Upper end										Diat.	Chloro.	Cyan.	Protoz.	
1	Pines Bridge	67.0°	3	42	2v					175	80	20	50	25	
"	At Dam, Surface									210	115	15	20	60	
	" Bottom	61.0°	12	43	2v					240	215		25		
2	Rye Pond										Diat.			Protoz.	
	Surface	69.0°	3	19	2v					60	25			35	
	Bottom														
2	Kensico Reservoir										Diat.	Chloro.	Cyan.	Protoz.	Rot.
	Surface	67.0°	2	22	2v					185	65	15	20	60	25
"	Bottom	66.5°	3	23	2v + 1e					265	80	35	60	65	25
1	Byram Lake										Diat.		Cyan.		
	Surface	70.0°	2	11	2v					60	60		20		
"	Bottom	69.0°	2	16	2v					185	130		55		
Aug. 31	De. Forest Corner									110	Diat. 10		Cyan. 35	Protoz. 65	

Another weekly report has been presented to you showing the physical and biological character of the water in each of the storage reservoirs of the Croton system and the Bronx and Byram system. A fac-simile copy of one of these reports is appended.

WEEKLY REPORT ON CONDITION OF THE WATER IN MANHATTAN AND THE BRONX.

No. 41.

Week Ending October 17, 1903.

Summary of Analyses.

	Croton Aqueduct 135th Street Gatehouse	Central Park Reservoirs: New — Efflux Gatehouse	Central Park Reservoirs: Old — North Division Efflux Gatehouse	Central Park Reservoirs: Old — South Division Efflux Gatehouse	Tap at City Hall Square	Williams-Bridge Reservoir Efflux Gatehouse
Physical Examination—						
Temperature (Fahrenheit)	60.0	64.0	64.0	64.0	66.0	61.0
Turbidity (Silica scale)	4	1	4	3	1	3
Color (Platinum cobalt standard)	33	4	25	25	18	20
Odor	3v	3v	2v + 1g	2v	2v	1v
Chemical Analysis (Parts per million)						
Nitrogen as albuminoid ammonia	.098	.152	.196	.200	.142	.122
Nitrogen as free ammonia	.026	.060	.036	.032	.024	.030
Nitrogen as nitrites	.002	.003	.001	.001	.001	.002
Nitrogen as nitrates	.05	.00	.00	.00	.05	.00
Total residue on evaporation	74.0	83.0	85.0	85.0		
Hardness	34.0	45.5	43.0	43.0		
Alkalinity	31.0	41.0	38.0	38.0		
Chlorine	2.0	1.6	1.3	1.3		
Iron	.25	.15	.15	.15		
Microscopical Examination—						
Microscopic organisms (Standard units per cubic centimeter)	1370	1070	1405	1030	805	280
Amorphous matter	490	675	600	525	150	165
Important Genera—						
Melosira	240	175	225	215	380	
Anabaena	125	225	375	245		
Aphanizomenon	335		240	100	90	
Coelosphaerium	165					
Synedra		390	225	210		
Bacteriological Examinations—						
Number of bacteria per c. c.	485	350	330	520	240	370

LUTHER R. SAWIN, Bacteriologist, Katonah Laboratory.

Daily Analyses at One Hundred and Thirty-fifth Street Gate House.

Day / Date — October — Month	Sunday	Monday 12	Tuesday 13	Wednesday 14	Thursday 15	Friday 16	Saturday
Turbidity		2	4	3	1	2	
Color		35	35	28	25	28	
Odor		2v	3v	2v	2v	2v	
Bacteria per c. c.		600	670	440	510	203	
Test for B. Coli. 0.1 c. c.		0	0	0	0	0	
1.0 c. c.		0	0	0	0	0	
10.0 c. c.		0	0	0	0	0	

Remarks.

The water throughout the week has been in excellent condition.

DANIEL D. JACKSON, Chief Chemist.

Dated October 20, 1903.

No regular reports have been made in regard to the quality of the water in the boroughs of Queens and Richmond, but special reports have been made from time to time upon these supplies. In case of sudden changes in the character of the water entering the City, caused, for instance, by excessive rainfall or by the sudden growth of organisms in the Central Park reservoirs, your office has been notified by telephone of the fact. It has been the intention to place the results of the analyses and inspections before you in such a way that you may acquire the necessary information as to the quality of the water with the least possible effort on your part.

Equipment of Laboratories.

The laboratory at Mount Prospect is equipped for making complete analyses for water, physical, chemical, microscopical and bacteriological, as well as for testing such supplies as coal, lubricating oil, asphalt, cement, etc. The laboratory in Katonah is equipped simply for making physical and biological analyses of water. It is virtually a field laboratory and in its equipment resembles the old Chestnut Hill laboratory of the Boston water supply more than any other. Inasmuch as this laboratory is a new one it deserves a brief mention.

The Katonah laboratory is located in the village of Katonah, about fifty miles from New York City. It occupies a central position on the water-shed, and samples may be conveniently sent to it from all the reservoirs. It has the further advantage of being located near the office of the Assistant Engineer who has charge of the sanitary inspection of the water-shed, and it has been the intention to make analytical work supplement the inspection work of the Engineer. The laboratory consists of a single room, in which are located all the necessary incubators, sterilizers, microscopes, etc., acquired for the work. It is in charge of Mr. Edward P. Walters, Bacteriologist, who formerly had charge of work of a similar character for the Metropolitan Water Works of Boston, Mass. At the present time the bacteriologist has but one assistant, but the experience during the past year has shown that additional help is needed if this laboratory is to serve its full purpose. In work of this character the importance of personal inspection of the reservoirs by the bacteriologist cannot be overestimated, and the routine work of the laboratory should be so adjusted that he can have time for making the necessary trips over the water-shed.

Table Showing Changes in Population on the Watershed of the Brooklyn Water Supply, 1850-1900.

Township or County.	1850.	1860.	1870.	1880.	1890.	1900.
Suffolk County	36,922	43,275	46,924	53,888	62,491	77,582
Queens County	36,833	57,391	73,803	90,574	128,059	152,999
Jamaica Township	4,247	6,515	7,745	10,088	17,654	30,761
Hempstead Township	8,811	12,376	13,999	18,164	23,756	27,066

CITY OF NEW YORK—COMMISSION ON ADDITIONAL WATER SUPPLY, DEPARTMENT OF CHEMISTRY AND BIOLOGY.

Table Showing Distribution of Population on the Croton and Bronx Watersheds.

Croton Watershed.

County New York State.	Township.	Boyd's Corner Reservoir.	West Branch Reservoir.	Middle Branch Reservoir.	Bog Brook Reservoir.	East Branch Reservoir.	Lake Glencida.	Lake Gilead.	Kirk Lake.	Lake Mahopac.	Muscoot Reservoir.	Titicus Reservoir.	Croton River.	Cross River.	Kisco River.	Total Watershed.
Dutchess	Beekman	13	....	8	....	8	....	....	....	....	....	....	....	....	....	29
	East Fishkill	105	....	49	....	....	....	....	....	....	....	....	....	....	....	154
	Pawling	....	....	54	....	541	....	....	....	....	....	....	....	....	....	595
Putnam	Kent	460	254	221	....	....	....	....	....	....	....	....	47	....	....	982
	Patterson	....	....	52	31	1,561	....	....	....	....	....	....	....	....	....	1,644
	South East	....	....	220	176	396	....	....	....	....	....	....	2,051	....	....	2,843
	Carmel	....	190	26	....	....	264	40	185	136	360	....	1,379	....	....	2,580
	Putnam	....	....	....	....	....	....	....	....	....	84	....	....	....	....	84
Westchester	Yorktown	....	....	....	....	....	....	....	....	....	....	....	1,099	....	20	1,119
	Somers	....	....	....	....	....	....	....	....	....	276	....	1,062	....	....	1,338
	North Salem	....	....	....	....	28	....	....	....	....	....	560	545	....	....	1,133
	Lewisboro	....	....	....	....	....	....	....	....	....	....	37	245	776	....	1,058
	Bedford	....	....	....	....	....	....	....	....	....	....	....	69	2,197	748	3,014
	New Castle	....	....	....	....	....	....	....	....	....	....	....	166	....	888	1,054
	Poundridge	....	....	....	....	....	....	....	....	....	....	....	....	221	....	221
Fairfield (Connecticut.)	New Fairfield	....	....	....	....	159	....	....	....	....	....	....	....	....	....	159
	Danbury	....	....	....	....	40	....	....	....	....	....	....	....	....	....	40
	Sherman	....	....	....	....	52	....	....	....	....	....	....	....	....	....	52
	Ridgefield	....	....	....	....	....	....	....	....	....	....	537	....	108	....	645
	Total population	578	444	630	207	2,785	264	40	185	136	720	1,061	6,736	3,302	1,656	17,744
	Drainage area, square miles	21.43	18.83	20.51	3.67	73.23	0.68	0.65	2.84	1.03	14.45	22.80	90.5	50.6	17.6	338.82
	Population per square mile	27	24	31	56	38	390	61	65	126	50	47	74	65	94	52

Bronx Watershed.

County. New York State.	Township.	Kensico Reservoir.	Rye Pond.	Byram Lake.	Total Watershed.
Westchester	North Castle	250	....	325	575
	Mount Pleasant	75	....	....	75
	Harrison	....	25	....	25
	Total population	325	25	325	675
	Drainage area, square miles	10.3	2.2	7.3	19.8
	Population per square mile	33	11	45	34

SECTION I. OF REPORT TO COMMISSIONER ON ADDITIONAL WATER SUPPLY.

1. Quality of the Present Water Supplies of New York City.

(1) General Character.

The City of New York, with its five boroughs, with its 327 square miles of area and its three and one-half million inhabitants, has 82 distinct sources of water supply. The City is an aggregate of many communities, which were once independent, and which once had their own systems of water works. In some cases the works of private companies were taken and operated by the City, and interconnections have been gradually established between adjacent distribution systems, but in general the old sources of supply continue in use.

The water supplies of the different portions of the City were developed according to local conditions. The smaller communities found supplies of ground water near at hand and utilized them by driving wells, while the larger communities, like Brooklyn and the old City of New York, were compelled to collect the surface water on distant watersheds and bring it to the city by aqueducts. Brooklyn later on reinforced its surface supply by driving wells. At the present time the citizens of Greater New York are supplied either with

1. Surface water, collected and stored in impounding reservoirs; or
2. Ground water, obtained by driving wells to various depths between 20 and 200 feet; or
3. Surface and ground water mixed.

The number and varied character of the different sources of supply are shown in Tables Nos. 1a and 1b, and the territories which they supply are shown in Plate No. 1.

These various sources of supply may be classified as follows, counting separately the different driven well stations and the most important lakes, ponds and reservoirs:

Borough.	Number of Ground Water Supplies.	Number of Surface Water Supplies.	Total.
Manhattan	..	12	12
The Bronx	2	4	6
Brooklyn	24	16	40
Queens	16	1	17
Richmond	7	..	7
Entire City	49	33	82

It will be seen from these figures that of the 82 water supplies which The City of New York possesses, 33 are "surface water supplies," and 49 are "ground water supplies." If the quantity of water derived from these sources is considered, the following classification, based in part upon measurements and in part upon estimates, will give the relative amounts used in the different boroughs at the beginning of the present year:

Borough.	Million Gallons per Day. Ground Water.	Surface Water.	Total.
Manhattan	..	260	260
The Bronx	1	*23	24
Brooklyn	50	60	110
Queens	13	†..	13
Richmond	6	..	6
Total	70	343	413

*Ten million gallons estimated as furnished by the Croton system.
†Surface water supply is only occasionally used.

In round numbers the present consumption of the City is 400 million gallons per day, and of this 83 per cent. is surface water, and 17 per cent. ground water.

In Brooklyn, and to some extent in The Bronx and in Queens, the surface waters and ground waters are mixed before they are distributed to the consumers. The following classification takes this into account:

Borough.	Number of Million Gallons per Day. Surface Water.	Ground Water.	Mixed Surface and Ground Water.	Total.
Manhattan	260	..	..	260
The Bronx	12	1	1	24
Brooklyn	..	19	91	110
Queens	..	13	*..	13
Richmond	..	6	..	6
Total	272	39	92	413

*Very small amount.

These figures show that 68 per cent. of the water supply is wholly surface water. 9 per cent. is wholly ground water, and 23 per cent. is mixed surface and ground water.

Filtration is used only to a very limited extent. No filtered surface water is served direct to consumers. Two mechanical filters purify the waters of Springfield and Baiseley's Pond of the Ridgewood system, before they are turned into the conduit, and two sand filters are being constructed for Simonson's Pond and Hempstead Storage Reservoir of the same system, but these filter effluents are mixed with other waters before they are delivered to the consumers.

The water from the driven wells of the Queens County Water Company in Far Rockaway, in the Borough of Queens, is filtered to remove the iron. None of the water supplied to Manhattan, The Bronx or Richmond is filtered. Filters have been projected, however, at Lake Mahopac and elsewhere on the Croton watershed.

(2) Typhoid Fever in New York City.

There is no better index of the general sanitary condition of a public water supply than the typhoid fever death rate of the community supplied by it. This is especially true of large cities, where the rate is less likely to be influenced by local epidemics due to causes other than water. A study of the typhoid fever statistics of The City of New York furnished an interesting and instructive commentary on the

character of the water supply at different periods. These statistics, kindly furnished by the Department of Health, and for which I am indebted to Dr. Ernst J. Lederle, Health Commissioner; Dr. William H. Guilfoy, Registrar of Records, and Dr. J. S. Bryne, Assistant Registrar, are given in Tables 2 and 3, and are shown graphically on plates 1 to 3.

Comparison With Other Cities—In the first place it should be stated that The City of New York now has, and has had for a long time, a typhoid fever death rate which compares most favorably with the large cities of the United States.

In Table No. 4 will be found the typhoid fever death rate for all cities of the United States which had population of more than 30,000, according to the United States census of 1900. The average annual death rate from typhoid fever for the 19,000,000 people there tabulated has varied during the past four years from 33 to 38, and has averaged 35 per 100,000. The average annual death rate for the year 1898 to 1901, inclusive, was 19.8 per 100,000 population for The City of New York, including all boroughs, while the extremes varied only between 16.3 and 21.0.

In round numbers the typhoid fever death rate for New York City may be considered as 20 per 100,000 inhabitants, or 0.20 per 1,000.

From Table No. 4 it will be seen that of the six cities which had a population of more than 500,000 in 1900 no city had as low a rate as New York. The nearest approach to it was St. Louis, which had an average rate of 25.4. Of the 32 cities which had populations between 500,000 and 100,000 only six had lower rates than New York. Of the 40 cities which had populations between 100,000 and 50,000 only six had rates less than New York. Of the 51 cities which had populations between 50,000 and 30,000 only eight had rates less than New York. Of all the 136 cities which had more than 30,000 population only 20 had rates lower than New York.

Manhattan—Although the typhoid fever death rate in New York is low in all the boroughs, it has not always been low and is now even slightly increasing. The available records for the old City of New York go back to 1868. In that year the death rate was 38.7 per 100,000 inhabitants, or 1.32 per cent. of the total mortality. In 1869 and 1870 there were severe droughts, and a water famine was prevented only by purchasing the right to use the water from Lake Gilead, Lake Glenida, Lake Mahopac, Kirk lake, Barrett's pond and China lake. (See "The Water Supply of The City of New York," by Edward Wegmann, C. E., New York, 1896, John Wiley & Sons.) During the dry period the typhoid fever death rate increased to 44.7. There were high rates, however, in 1872 and 1875; 1872 was a very dry year and the natural yield of the watershed was low.

It is interesting to note, moreover, that the Boyd's Corner reservoir was under construction in 1872 and the Middle Branch reservoir in 1875. In those early days less attention was paid to the sanitation of camps than at present, and the possibility that workmen employed on these constructions may have contributed in some degree to raising the typhoid death rate is one which is within the limits of experience in other places, though it must be regarded as speculative.

In 1879 the typhoid death rate had fallen to 22.8 per 100,000 inhabitants, or 0.95 per cent. of the total mortality, due to the increased storage capacity on the watershed and to more favorable meteorological conditions. A very severe drought occurred in 1880, and the rainfall of 1881 was very low. These were perhaps the most severe droughts since 1842. The storage was drawn down almost to the vanishing point, and it was found necessary to throttle the outlet gates at Central Park reservoir and to use extraordinary measures to curtail waste of water. The watershed had hardly regained its storage, when another dry year occurred in 1883, again depleting the supply. During this period, from 1880 to 1884, there was a marked increase in the typhoid fever death rate. It rose first to 30.8 and then to 47.7 per 100,000 inhabitants, the highest point reached within the period covered by the records. It fell somewhat in 1882, but increased again in 1883, the curve thus inversely following the rainfall.

Between 1883 and 1897 the typhoid rate steadily decreased. This may be attributed to the constantly increasing storage capacity, to the generally more favorable meteorological condition, and to the expedients adopted to protect the water supply from pollution. In 1888 the State Board of Health established rules and regulations relating to the pollution of the watersheds, and in 1893 extensive purchases of land and buildings were begun along the stream courses and around the reservoirs. In 1894 a sewage purification plant was established on the watershed at Brewsters. The improved conditions were well illustrated in the year 1897, when, in spite of small rainfall and a very low stream flow, the typhoid fever rate did not materially increase.

The increase in 1898 was due to the soldiers returning from Cuba after the Spanish war. The rate for 1899 was only 14.6 per 100,000 inhabitants, the lowest during the period covered by the records. Since 1899 the rate has risen slightly, but has not gone above 20 per 100,000 inhabitants.

The influence of the rainfall upon the typhoid fever death rate in New York is quite marked. The larger the annual rainfall the smaller is the number of deaths from typhoid fever, other conditions remaining the same. It is not the total annual rainfall, however, which controls the rate, so much as it is the summer rainfall and its distribution. Extreme conditions are dangerous. Prolonged periods of drought, followed by heavy rains, tend to increase stream pollution and to reduce the beneficial effects derived from sedimentation, long storage, etc.

Bronx—The old City of New York included what are now the boroughs of Manhattan and The Bronx. Since consolidation separate records have been kept for the different boroughs. They show that the typhoid fever death rate is considerably lower in The Bronx than in Manhattan. In 1889 it reached a phenomenally low rate, namely, 8.7 per 100,000 inhabitants.

Brooklyn—From 1868 to 1894 the typhoid fever death rate was lower in Brooklyn than in New York; since 1894 it has been higher. In 1868, the data of the first available record, the rate was 28.5 per 100,000, or 1.18 per cent. of the total mortality. Between 1868 and 1879 there was a general decline in the rate, due in all probability to the closing of hundreds of polluted wells within the City limits. The decline was not continuous, however, and during the dry years of 1870, 1872 and 1875 there were reactions. This was especially true of the year 1872, when the rate increased to 34.7 per 100,000 inhabitants, the highest point reached within the history of the records. In 1879 the rate dropped to 10.7, the lowest point reached.

Between 1880 and 1890 there was a gradual increase in the number of deaths from typhoid fever. During this period the draught upon the watershed was constantly increasing. The "pond pumping stations" were started in 1879, and about this time the storage reservoir at Hempstead was put into use, thus adding a supply which was considerably more open to pollution than most of the sources of supply then in use. The year 1883 was a very dry year, but at that time there was no increase in the typhoid death rate, although during the year 1885, which was also a very dry year, there was a considerable increase. During this year there was a shortage of water in the City.

Between 1890 and 1897 several causes contributed to lower the rate. The new watershed, east of Millburn, was drawn upon in 1891, and this added a considerable volume of relatively pure water. In 1892 Basin 3 was added to Ridgewood reservoir, thus increasing the storage capacity of the distribution reservoir. In 1893 the water-closets of the village of Hempstead were panned and taken care of by a private company, while in 1894-5 this work was assumed by the Water Department and its scope extended to other portions of the watershed. The towns of Flatbush, Gravesend and New Utrecht were annexed in 1898. These towns were all supplied with water of good quality, and this additional increase of population in itself tended to lower the death rate. In 1896 Flatlands was annexed. Baiseley's pond was cut off from the supply in 1894 on account of pollution, and in 1897 Springfield pond was cut off for the same reason.

In 1898 came the Spanish war. Many of the soldiers returning from Cuba with typhoid fever were carried to the hospitals in Brooklyn, and this naturally increased the rate. A study of the hospital records during that year showed that if the soldier cases had been excluded the annual typhoid fever death rate, instead of being 24.6, would have been about 19 per 100,000 inhabitants. Since 1889 the rate has been rising with irregular steps. This can be attributed to no other cause than the depletion of the water supply, which has made it impossible to adequately guard against pollution. During the past two years the succession of droughts and freshets have not been favorable to furnishing good water from a watershed so nearly exhausted in its capacity and provided with such small storage reservoirs as exist on the Ridgewood system. The population on the watershed, moreover, is steadily increasing.

The frequent occurrence of growths of microscopic organisms in Ridgewood and Mt. Prospect reservoirs, due to the mixing of the ground water with the surface water, has rendered it imperative to isolate these reservoirs at times and pump the water around them through the by-passes directly into the mains. This has prevented much unpalatable water from being sent to the City, but it has reduced the time required for the water to reach the consumers by about two days, and to that extent has rendered the water less safe, should it become infected in any of the streams.

While it is true that there appears to be a general inverse ratio between the typhoid fever and the rainfall, it must not be forgotten that the effects of the meteorological condition are not confined to the watersheds which supply water to the City. In great measure they also affect country wells, and water supplies elsewhere in the region surrounding the metropolitan district, thus increasing the possibilities of typhoid being brought to the City by agencies other than water.

Queens—The water supplies of the Borough of Queens are taken from driven wells, and these sources may be practically excluded as sources of typhoid fever in that borough. For thirteen years before consolidation the typhoid fever death rate was approximately 20 for Long Island City, 12 for Newtown and 15 for Flushing. Since 1898 the death rate for the borough has varied from 11.7 in 1898 to 20.8 in 1900. Typhoid fever in this borough is probably due almost entirely to local causes, one illustration of this being the epidemic at Bayside in 1902, which was found to be due to infected milk furnished by a certain dealer.

It is worth noting that since 1885, the year of the earliest available records, the death rate in Long Island City, Flushing and Newtown have not fluctuated synchronously with the rates in either Brooklyn or New York, and has shown no relation to the rainfall.

Richmond—The average typhoid fever death rate in the Borough of Richmond since 1898 has been higher than that in any borough except Brooklyn. In 1899 it rose to 30.6 per 100,000, but since then it has fallen, until in 1902 it was 15.5. The public water supplies of the borough are all taken from underground sources, and it is probable that they are in no way responsible for the typhoid fever in this borough.

The general low death rate from typhoid fever is a fact which reflects creditably upon the City. It is true, of course, that in a large city there is difficulty in obtaining accurate statistics, and the actual death rate is probably larger than that reported; but after making all due allowance for errors, the fact remains that the annual number of deaths from typhoid fever is surprisingly small. This could not be so if the public water supplies were other than reasonably safe from the sanitary standpoint.

It has been shown that 18 per cent. of the water supplied to the City is taken from driven wells. All of this ground water may be considered as entirely safe from the sanitary standpoint; and while the water from different stations vary in many of their characteristics, not in a single instance is there reason to suppose that they are unhealthful.

This is a fact generally true of driven well water, but it is doubly true where the wells are driven in such sandy material as is found on Long Island.

Eighty-two per cent. of the water supplied to the City, however, is collected from the surface of the ground, and is used without filtration; and while the influence of the surface waters upon the amount of typhoid fever in the City is probably very small indeed, yet it cannot be considered as a negligible factor. It must be admitted that all of this water is open to possible infection, the danger of which must vary according to the amount of direct or indirect pollution from the population dwelling upon the watersheds. The watersheds of the Croton, Bronx, Byram and Ridgewood systems are by no means unpolluted, although for the most part the direct pollution of the water is prevented. There must be some meaning, however, in the following figures:

	Bronx.	Manhattan.	Brooklyn.
Typhoid fever death rate, 1903, per 100,000.....	13.9	19.3	25.8
Estimated population on the watersheds which form the chief sources of supply	34	52	208

While there is no general artificial system of purification for any of the surface waters, save in a few instances on the Ridgewood system, there are certain natural agencies of purification which deserve consideration, and which are described beyond.

(3.) Sanitary Supervision of the Public Water Supplies.

The practical measures which are being taken to eliminate the sources of pollution on the various watersheds are described on a later page. They include the abatement of industrial nuisances, the establishment of local systems of sewage disposal and local filter plants, and a sanitary patrol of the watersheds. These are measures which are all immediately and continuously necessary. The end will not be reached, however, until all of the water for the supply of Manhattan and The Bronx is filtered before delivery to the consumers, and not until all the surface supplies on Long Island have been replaced by ground water sources. Meanwhile it is necessary to keep a constant watch on the quality of the water by means of physical, chemical and biological analyses, and for this purpose samples of water are collected every day from the terminus of the Croton Aqueduct at One Hundred and Thirty-fifth street, Manhattan, and from the terminus of the Brooklyn Aqueduct at the Ridgewood pumping station, besides several taps in Manhattan and Brooklyn. Once a week samples are collected from all the distribution reservoirs, supply ponds and storage reservoirs. Once a month or once a quarter every driven well supply is analyzed. This work is done chiefly at Mt. Prospect Laboratory, except that the samples from the Croton watershed, intended for biological examination, are sent to the branch laboratory at Katonah. These laboratories are referred to on page , and the work at Mt. Prospect Laboratory has been described in several of the scientific journals. (See "Proceedings Brooklyn Engineers' Club," Vol. IV., p. 106.) The steady growth of this system of analysis is shown by the following table, which gives the number of samples analyzed each year from the time when Mt. Prospect Laboratory was established in 1897 to the present date:

Year.	Laboratories.	Scope of the Analyses.	Number of Samples.
1897	Mt. Prospect	City of Brooklyn.....	1,240
1898	Mt. Prospect	Boroughs of Brooklyn and Queens.....	2,180
1899	Mt. Prospect	Boroughs of Brooklyn and Queens.....	2,393
1900	Mt. Prospect	Boroughs of Brooklyn and Queens.....	2,707
1901	Mt. Prospect	Boroughs of Brooklyn and Queens.....	3,029
1902	Mt. Prospect	Boroughs of Brooklyn, Queens and Manhattan.....	6,021
1903	Katonah	Entire City of New York.....	18,023
	Poughkeepsie	Special investigations for Committee on Additional	
	Mt. Prospect	Supply	

In addition to the analyses made in the laboratories of the Department of Water Supply, Gas and Electricity, analyses are regularly made by the Department of Health, in continuation of their work which began long before the Department of Water Supply took up the matter. Their analyses, however, are made with reference simply to the sanitary quality of the water, their field of operations being logically limited to the character of the water in its relation to the public health.

To publish the results of all the analyses which have been made would be to fill several volumes, but inasumch as there are no complete published records of analyses showing the general characteristics of all the various sources of supply, it has been thought best to present a summary of the most important results. These are given in Tables Nos. 5 to 8.

Before describing these, however, it may not be out of place to offer a few words of explanation of the character of the analyses made and the meaning of the results:

(4.) Requisites of a Public Water Supply.

The requisite qualities of a water to be used for purposes of public supply are as follows:

1. It should be free of organisms capable of producing disease and of all irritating or poisonous substances, whether organic or inorganic.
2. It should have an agreeable appearance; that is, it should be practically clear and colorless.
3. It should be odorless and tasteless.
4. It should not be too hard for domestic or industrial uses, and it should be practically free of iron.
5. It should not contain substances in solution liable to corrode metal work either in boilers or in the distribution or service pipes.
6. It should preferably have a cool and equable temperature.

These requisites differ in their relative importance. First, and before everything else, a public water supply must be safe from the sanitary standpoint. It must not, by scattering the germs of disease, be a menace to the health and the lives of the consumers. In so far as a water supply is open to pollution, it is dangerous to use.

It is, perhaps, unfortunate that the characteristics of a water which make it unsafe do not at the same time render it unpalatable, but it is true to a very great extent that safety and palatability of water are independent of each other. Those characteristics which render a water distasteful are recognizable by the senses, but the presence of disease germs is not. For example, a water which is colored or turbid, and especially a water which has a bad odor, is naturally repellant, while a hard water has objectionable qualities which are evident in every household and boiler-room, yet a water may possess all these objectionable features and be perfectly safe. On the other hand, a water may be clear and cold, and in every respect pleasant to drink, and yet contain disease-producing germs or poisonous metallic salts. Thus it is that public opinion as to the sanitary value of a water supply is often fallacious. The brown color of water is due almost invariably to harmless vegetable matter in solution; turbidity is due to clay or iron or other matter in suspension, while most of the bad odors are produced by microscopic organisms, not disease germs. Upon these aesthetic qualities, as such, the consumer is a good judge, and they are proper subjects of complaint, but high color, turbidity and odor are usually wrongly interpreted by the ordinary citizen. They do not in themselves indicate pollution. The characteristics which render a water unsafe from the sanitary standpoint can be detected only by the expert using the most delicate chemical and biological tests.

The other characteristics mentioned, such as hardness, the presence of corrosive substances, etc., are by no means unimportant. They detract from the general acceptability of a water and have an important bearing upon its industrial value, as will be pointed out later.

5. Water Analyses.

A complete sanitary water analysis, as made in the modern laboratory, consists of four parts: the physical examination, the chemical analysis, the microscopical examination and the bacteriological examination. For a complete understanding of the quality of the water, all of these analyses are required, but in special cases it is necessary to proceed further and make what is termed a mineral analysis. Fifteen years ago the only analysis made was the chemical analysis, but the development of the science of bacteriology has made a change in many of our ideas concerning the quality of drinking water, so that at the present time the bacteriological examination ordinarily gives more practical results from a sanitary point of view than the chemical analysis. The microscopical examination is of still more recent origin. Its principal function is that of ascertaining the presence of those microscopic organisms which impart a bad taste and odors to drinking water. Strangely enough, the physical examination was the last one to take definite shape. The old methods of stating the amounts of turbidity and odor in indefinite phrases have been replaced by more accurate and convenient forms of expression. It has been found that these different parts of the complete analysis are interlocking, and often the results of a microscopical examination are necessary in order to properly interpret the figures obtained by the chemical analysis. The up-to-date analyst, however, can usually tell what portions of the analysis may be omitted without loss of any important information. It is fortunate that this is so, because it is found that in the work of routine supervision, more can be learned about the general condition of the water by making more complete analyses of samples collected only occasionally, and thus it is that the daily samples which are collected from the terminals of the aqueducts are given only a partial analysis.

Physical Examination—The physical examination includes the determination of those qualities of water which are evident to the senses, such, for example, as its temperature, turbidity, color and odor. The temperature of the water needs no comment. The odors of water are variously described as vegetable, aromatic, fishy, moldy, disagreeable, etc. The vegetable odors are due largely to organic matter in solution. The aromatic, grassy and fishy odors are caused almost entirely by microscopic organisms. Different organisms give rise to different odors, and often organisms present can be detected simply from the odor of the water. The microscopical examination, however, serves to give all necessary details as to the character and number of these organisms, hence the relation between the microscopical examination and the determination of odor is very intimate. The odors which are termed moldy, musty, disagreeable, etc., are due largely to organic matter in decomposition, and their presence is to be considered in connection with the sanitary character of the water.

The estimation of the intensity of the different odors is naturally very indefinite, and is one where the personal equation plays a very large part. It has been found practical, however, to grade the odors on a scale of numbers which may be defined substantially as follows:

Numerical Value.	Term.	Approximate Definition.
0	None.	No odor perceptible.
1	Very faint.	An odor that would not be ordinarily detected by the average consumer, but that could be detected in the laboratory by an experienced observer.
2	Faint.	An odor that the consumer might detect if his attention were called to it, but that would not otherwise attract attention.
3	Distinct.	An odor that would be readily detected and that might cause the water to be regarded with disfavor.
4	Decided.	An odor that would force itself upon the attention and that might make the water unpalatable.
5	Very strong.	An odor of such intensity that the water would be absolutely unfit to drink. (A term to be used only in extreme cases.)

By using simple abbreviations for the quality of the odors and by rating the intensity of the odors on a numerical scale, the records are much simplified. Ordinarily the taste of water is about the same as its odor. In fact, many of the so-called tastes are really odors. Certain tastes, however, are independent of odor, such, for example, as that of brackish water, or of a water which contains a large amount of iron in solution. In by far the great majority of cases, however, it is unnecessary to make a record of the taste independent of the odor.

The color of the water is due to vegetable matter in solution. It is acquired largely from swamp land on the watershed, and is practically an extract of the leaves, bark, twigs, etc., which accumulate upon the surface of the ground. Ground waters ordinarily have no color, and the amount of color in surface waters is dependent upon the character of the watershed. The color of water is measured by comparing it with certain artificial tints imparted to distilled water by adding to it measured amounts of certain salts of platinum and cobalt. The figure which represents the color is the number of parts per million of the platinum salt used to obtain that color. A water which, like distilled water, has no color is regarded as 0. As soon as the color reaches 15 or 20 it begins to be noticeable in a porcelain bathtub or a washbowl, but not until the color is above 30 does it attract much attention in a glass tumbler upon a white cloth. If the color rises to 40 or 50 it has a brownish cast in a tumbler, while if it reaches 75 it has the appearance of very weak tea. The color of the water in swamps frequently rises to more than 100, and in the Dismal Swamp of Virginia samples have been collected which had a color of more than 800. It should be noted that the color of water is due to substances in solution, and is to be distinguished from the apparent color due to matter in suspension. This leads to the subject of turbidity.

The turbidity of water is caused by matter in suspension. Sometimes suspended matter is in a very finely divided condition, as clay. At other times it consists of very much larger particles, each of which may be easily seen with the naked eye. The turbid waters of the Southern and Western rivers are due largely to the very fine clay and river salt which they contain. Such substances settle slowly in water, and the turbidity produced by them is therefore quite permanent. Most of the waters of New England and New York, however, are relatively clear in their normal condition. They become turbid only after heavy rains, when they receive the wash from the surface of the ground. Much of this material is comparatively coarse, and settles rapidly. Some of it is organic in character. The waters of lakes sometimes become turbid from the presence of microscopic organisms. The waters of distributing systems sometimes contain large amounts of suspended matter, derived from the pipes or aqueducts. This is usually present in flakes of considerable size, so that the water may be said to be "dirty" rather than turbid. It is convenient, however, to apply the word "turbidity" to all these forms of suspended matter, and it has been found that for all practical purposes they may be measured by the same standard. The standard used for measuring turbidity is that known as the silica standard, the basis of which is an artificial preparation of diatomaceous earth so prepared for use by washing and grinding that the silicious material is in an extremely finely divided state. The figure for turbidity given in the record means that the water under examination is as turbid as distilled water would be if that number of parts per million of the standard silica was added to it. A water which has a turbidity of 3 or over is noticeably turbid. It seldom becomes offensively turbid under 5 or 10, although this varies more or less according to the character of the suspended matter. Futhermore, people of certain sections of the country become accustomed to turbid streams, and waters which New England people would call turbid others might consider reasonably clear.

Chemical Analysis—The chemical analysis of water consists of determining the chemical character of the foreign substances present. Some of these determinations are made for the purpose of ascertaining the sanitary quality of the water. These constituents are usually of little importance of themselves, and are chiefly valuable to indicate the past history of the water. Other constituents are determined for the sake of their own influence upon the quality of the water. Prior to the advent of bacteriology the chemical analysis was the most reliable means one had for ascertaining the safety of water for drinking purposes, but to-day the chemical results form only a part of the necessary analytical data. It is useful, however, to know the amount and character of the nitrogenous matter present. The nitrogen is usually expressed as being present in four forms, either as albuminoid ammonia, free ammonia, nitrites or nitrates. The expression "nitrogen as albuminoid ammonia" refers to the nitrogen present in organic matter before any decomposition has taken place. The "free ammonia" represents the nitrogen set free from the organic matter by initial decomposition; and the "nitrogen as nitrites" represents a later stage in that process. The "nitrogen as nitrates" represents the final mineralized condition of the nitrogen in which it is no longer organic matter. These four forms of nitrogen, therefore, serve to indicate the state of the organic matter present with reference to its decomposition. They do not, however, show whether or not the original organic matter was or was not derived from dangerous sources. Taken in connection with the rest of the analysis, however, these findings are of importance. The chlorine found in water in itself has little sanitary significance, but inasmuch as chlorine is an accompaniment of sewage its presence in water is indicative of pollution. All natural waters situated reasonably near the seacoast, however, contain, even when unpolluted, a certain amount of chlorine which varies according to their distance from the sea, and it is necessary to subtract this "normal chlorine" from the figure obtained in order to estimate how much of the chlorine was due to pollution. The amounts of normal chlorine have been carefully determined for some of the New England and Middle States, so that the normal may be readily obtained for any given locality.

By the hardness of water is meant the presence of those salts of lime and magnesia which decompose soap, a phenomenon well understood in every household, and which is referred to at length later on. The alkalinity represents that portion of the hardness due to the carbonates and bicarbonates of calcium and magnesium, while the difference between the akalinity and the hardness is practically measured by the sulphates of the same salts. The amount of iron present is of little importance except when it amounts to more than about 0.5 parts per million. From there up it is liable to render the water objectionable by causing stains of iron rust when used in the laundry. The "total solids," or, as they are sometimes called, "residue on evaporation," include practically all of the constituents above mentioned. The loss of weight when this residue is heated gives a rough measure of the organic matter present, but the determination of this "loss on ignition" is subject to so many errors that it is often omitted from the analysis in the case of ground waters. The results of the chemical analysis are best expressed in parts per million by weight, which is practically equivalent to milligrams per liter. The method of expressing results in grains per gallon is now antiquated, but it may not be out of place to state that results given in parts per million may be transferred to grains per U. S. gallon by dividing the figures by 17.1.

Microscopical Examination—Surface waters contain many forms of animal and vegetable life which are too small to be observed with the naked eye, but which are very much larger in size than the bacteria. These microscopic organisms, as they are conveniently called, may be studied by means of the microscope. Examination is made by first collecting them upon the surface of a tiny sand filter, and transferring them from this in concentrated form to the stage of a microscope, where they are identified and counted. It is customary to express the results in number of standard units of organisms per cubic centimeter. A standard unit is the unit of size used for measuring them, and is practically equivalent to a surface area of 400 square microns (1 micron equals .001 millimeter). It is the microscopic organisms which give rise to the aromatic, grassy and fishy odors above mentioned.

Bacteriological Examination—The number of bacteria in water is ascertained by a process known as cultivation on nutrient gelatin, the details of which need not be here described. The result is simply the determination of the number of bacteria of all kinds present in the water which will grow upon that medium in forty-eight hours at a temperature of 20 degrees centigrade. No distinction is made between harmful and harmless bacteria, and the result does not actually state the total number of bacteria present. The method is one of some crudity, and is far from being what is desired, yet the results are of considerable value, although they ought to be considered as having merely a relative value. Unfortunately there is no practical method by which the presence of dangerous disease germs in water can be detected. Not even can the germ of typhoid fever be isolated from water by means of laboratory methods, although there seems to be a popular impression that it can be. In the intestines of man and warm-blooded animals generally there dwells a bacterium, however, known as bacillus coli, and this organism fortunately can be detected in water with a reasonable degree of precision. We have in this determination, therefore, one of the most reliable and practical methods of ascertaining the sanitary character of the water, and the test becomes of especial value when it is made quantitatively. On account of the labor involved in ascertaining the presence of this germ, an exact quantitive result cannot be secured, but if different quantities of water are used in making the qualitative test, the data obtained approach in value the results which would be obtained if the determination were more exactly quantitative. In Mount Prospect Laboratory it has been customary to make the test in three different quantities of water, namely, 0.1, 1 and 10 cubic centimeters. These quantities were selected after a long series of experiments in which it was found that only waters suspicious in character constantly gave positive tests in .01 cubic centimeters, while perfectly safe waters occasionally gave positive tests in 10 cubic centimeters. The determination of the total number of bacteria and the test for bacillus coli made upon three different quantities of water, constitute the bacteriological examination made in the laboratory.

Only in rare instances is it deemed necessary to proceed further with the qualitative study of the different species present.

Quality of the Water Supply of the Borough of Manhattan.

The Borough of Manhattan is supplied with water by the Croton system, which is collected from the Croton river and its tributaries and stored in 8 artificial storage reservoirs, 5 large natural lakes and several smaller ponds. The drainage area of the Croton river above the old dam is approximately 338 square miles. The drainage areas of the various tributaries, together with other data, are given in Table 1. From the lower end of Croton lake, two aqueducts, about thirty-five miles long, lead to the distribution reservoirs in the city. The old aqueduct is not in use at the present time. Both aqueducts terminate at the One Hundred and Thirty-fifth Street Gate House, and from this point several lines of 48-inch pipe lead to the main distribution reservoirs in Central Park. These consist of the old reservoir divided into two basins, known as the North and the South Basins, and the New Receiving reservoir which has a dividing wall 33 feet high, but which is entirely under water when the reservoir is full. All of the water of the low service system passes through one or the other of these reservoirs. Water for the high service districts is repumped either at the Ninety-eighth Street Pumping Station or at High Bridge. The distribution system will be modified and considerably improved on the completion of the new reservoir at Jerome Park.

The Croton water as delivered to the consumers may be characterized as reasonably safe from the sanitary standpoint; noticeably colored and slightly turbid, with an odor persistently vegetable and occasionally aromatic, grassy, or even fishy; reasonably soft, a good boiler water and generally satisfactory for industrial purposes. Whatever complaints have been made against the water have been due to its occasional unsightly appearance and bad odor. Its physical qualities, therefore, merit our first attention.

The water yielded by the watershed is represented by the samples which are collected daily from the aqueduct at the One Hundred and Thirty-fifth Street Gate House. The results for the present year are shown chronologically on Plate No. 2, together with the rainfall on the Croton watershed and the result of microscopical examinations.

Turbidity—The turbidity of the water varies more or less from day to day, sometimes being as low as 1 on the silica scale and at other times running as high as 25. The average turbidity from January to September, 1903, was 5.

The high turbidities usually follow heavy rainfalls, and are evidently caused by them. The rain washes the dust and silt from the surface of the ground into the streams and reservoirs, and it eventually reaches the aqueduct and distribution pipes. The suspended matter contains but little clay, and the particles are comparatively large. They settle readily, therefore, so that streams and reservoirs soon "clear up," making the turbid periods of short duration. It has been found that most of the turbidity in the water which reaches the aqueduct is acquired more from Croton lake itself than from the watershed at large. This lake is long, narrow and not very deep in its upper portion. It has a muddy bottom, and when drawn down, mud flats, which represent the accumulated sediment of many years, are exposed. When the water is low, a sudden rain disturbs the deposits and makes the water roily. A heavy wind also creates currents which disturb the mud deposits. During the month of May, daily samples collected at the upper end of Croton lake, had an average turbidity between 2 and 3, while the water in the aqueduct had an average of 8. There are reasons to believe that the aqueduct contain deposits which under unusual conditions may add to the turbidity of the water in the City.

The water delivered to the consumers is generally less turbid than the water at the One Hundred and Thirty-fifth Street Gate House. This is because of the sedimentation which takes place in the reservoirs at Central Park and High Bridge, and in the pipes of the City. Occasionally, however, growths of organisms in these reservoirs increase the turbidity. These facts are shown by the following figures:

Turbidity—(Parts Per Million).

Month (1903).	135th Street Gate House.	Central Park Reservoir Outlets. New.	Old. North.	Old. South.	Tap at City Hall Square.
January	5	3	2	3	3
February	6	5	4	4	3
March	5	4	4	5	4
April	4	4	4	5	3
May	8	4	4	4	5
June	6	3	3	4	2
July	3	1	6	3	2
August	2	3	4	6	2
Average	5	3	4	4	3

Color—The color of the water at the One Hundred and Thirty-fifth Street Gatehouse also varies with the rainfall, but the fluctuations are not as great as those of turbidity. The extreme range is from about 16 to 30, and the average is about 24. It is nearly always high enough to be noticeable in a clear glass tumbler. The color is not acquired at any particular place on the watershed, although the swamp lands in the upper portion of the watershed tend to materially increase it. For example, the average color of the water in the streams above Boyd's Corner Reservoir is about 50, or about double the average color for the entire supply. A certain amount of color is acquired in Croton Lake. By draining the swamp areas on the watershed the average color might be reduced to about 20. Filtration would reduce the color to about 15, and possibly to 12, at which point it would scarcely attract attention.

Odor—It has been stated that the Croton water has a persistent vegetable taste and odor. This is plainly shown by the shaded areas in Plate No. 2. The odor is usually distinct, that is, it is one readily noticed by one drinking the water. It is due to the presence of organic matter. The same substance that make the water colored also give it a vegetable taste. Some of the suspended matter adds to this odor, as well as some of the microscopic organisms. The vegetable odor, although undesirable, is one that is not wholly unpleasant, and unless unusually strong, one readily becomes accustomed to it.

The water at times has a moldy odor, due to decomposing organic matter. Sewage polluted water has this odor intensified sometimes until it is "musty" rather than moldy, but not all moldy odors are due to pollution. A moldy odor, however, always leads one to suspect the quality of the water, unless its cause can be definitely attributed to something other than pollution. A study of the seasonal distribution of the moldy odors, in the Croton water, as given by Plate No. 2, shows that they are seldom observed apart from the presence of microscopic organisms, hence they may be fairly attributed to that cause. Moldy odors are sometimes observed in the water from the dead ends of the system.

Microscopic Organisms—The most objectionable odors observed in the Croton water are those due to the presence of microscopic organisms. Some of these organisms are always present in the water, but there are many different genera, and they come and go with the seasons, often appearing and disappearing with great suddenness. They are found in all of the storage basins on the watershed, but they appear to attain their greatest development in the reservoirs at Central Park.

The following figures show their relative abundance in the different storage reservoirs.

Microscopic Organisms—(Average Number of Standard Units per c. c.).

Reservoir.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
Sodom	....	145	177	481	1,095	899	804	....	....
Bog brook	....	483	317	1,406	1,703	783	359	....	....
Middle Branch	....	443	414	3,748	1,366	292	948	....	....
Boyd's Corner	....	125	86	526	661	196	208	....	....
West Branch	....	667	714	1,418	1,045	484	893	....	....
Lake Gleneida	....	117	106	446	214	35	26	....	....
Lake Gilead	....	49	90	76	46	80	41	....	....
Lake Mahopac	....	695	446	1,235	313	88	40	....	....
Kirk Lake	....	658	464	2,315	341	242	149	....	....
Muscoot	....	895	471	1,258	1,186	617	215	....	....
Titicus	....	593	474	938	954	596	1,345	....	....
Croton Lake	....	290	279	1,207	753	434	1,498	....	....
One Hundred and Thirty-fifth Street Gate House	206	205	202	1,206	1,300	844	1,855	945	1,701
Central Park, new	236	222	271	1,066	800	966	1,411	2,855	2,229
Central Park, old, north basin	242	327	1,110	1,652	3,496	1,870	4,675	2,795	5,290
Central Park, old, south basin	329	251	428	1,025	2,574	1,283	2,445	3,021	2,672
Tap at City Hall square	155	285	219	739	815	882	1,445	1,186	933

To describe in full the nature and magnitude of the growth of microscopic organisms would too greatly extend this report, hence a few generalizations must suffice.

Since the examinations of the Croton water were begun in June, 1902, the following genera have been observed. Those printed in capital letters represent the genera found at any time in quantities greater than 100 standard units per c.c. Those found in quantities less than that have but little practical effect on the quality of the water. The genera which are starred are those likely to cause bad tastes and odors.

LIST OF MICROSCOPIC ORGANISMS WHICH HAVE OCCURRED IN THE CROTON WATER.

Plant Organisms.

Diatomaceae—Amphora, ASTERIONELLA,* CYCLOTELLA, cymbella, DIATOMA,* epithemia, fragilaria, gomphonema, MELOSIRA, meredion, navicula, nizcschia, stephanodiscus, surirella, SYNEDRA,* TABELLARIA.*

Cholrophyceae—Chaetophora, botryococcus, coelastrium, CLOSTERIUM, confera, COSMARIUM, desmidium, dictyosphaerium, dimorphococcus, draparnaldia, EUDORINA, GONIUM, pandorina, PROTOCOCCUS, raphidium, SCENEDESMUS, SPIROGYRA, STAURASTRUM, VOLVOX, xanthidium, zygnema.

Cyanophyceae—ANABAENA,* APHANIZOMENON,* CHROOCOCCUS, CLATHROCYSTIS,* COELOSPHAERIUM,* cylindrospermum, merismopedia, MICROCYSTIS,* OSCILLARIA.

Schizomycetes and Fungi—Cladothrix, CRENOTHRIX, leptothrix, mold hyphae.

Animal Organisms.

Protozoa—Anthophysa, arcella, BURSARIA, CERATIUM, cercomonas, codonella, coleps, colpidium, CRYPTOMONAS, diffulgia, DINOBRYON,* enchelys, EPISTYLIS, euglena, glenodinium,* halteria, mallomonas, monas, nassula, opalina, paramaecium, phacus, peridinium, stentor, SYNURA,* titinus, trachelomonas, UROGLENA,* VORTICELLA.

Retifera—ANURAEA, ASPLANCHNA, BRACHIONUS, CONOCHILUS, NOTHOLCA, POLYARTHRA, ROTIFER, SYNCHAETA, TRIARTHRA.

Crustacea—Branchipus, Bosmina, cyclops, DAPHNIA.

Miscellaneous——Acarina, ova.

The observations on the watershed have not yet covered a sufficiently long period to enable one to classify the storage reservoirs with respect to the prevalence of these organisms. All of the reservoirs appear to be more or less affected. The heaviest growths during the summer of 1903 occurred in Sodom Reservoir, Bog Brook Reservoir, Middle Branch Reservoir, West Branch Reservoir and Croton lake. Lake Gleneida, Lake Gilead and Boyd's Corner Reservoir contained comparatively few. Speaking generally the older reservoirs give less trouble than the newer ones. Croton lake, however, receives water from all the reservoirs above, and its water is influenced by the particular reservoirs which are being used.

The organisms which ordinarily give rise to the worst odors in the Croton Aqueduct are the blue-green algae. Several genera, such as anabaena, aphanizomenon, etc., unite to give the water a grassy, moldy odor.

The growths of organisms in the reservoirs on the Croton watershed differ in no respect from those which occur in storage reservoirs elsewhere, except in their intensity. The diatomaceae occur in the spring and autumn, the chlorolphyceae and cyanophyceae occur in the summer and early fall, while the protozoa occur spasmodically at all seasons. These growths do not reflect the sanitary quality of the water, but rather the unclean condition of the reservoir bottoms. When these reservoirs were constructed no precautions were taken to remove the peat, turf, stumps and organic matter from the reservoir sites, which modern engineering considers necessary when the water is to be used without filtration. The areas were simply flooded and the organic matter left to decompose. This decomposition was very active for the first few years after construction, and the water drawn from the lower gates was most offensive. Gradually the active decomposition has ceased, and the older reservoirs are acquiring the characteristics of old lakes with muddy bottoms.

Most of the reservoirs are quite deep, and they undergo the same process of stagnation during the winter and summer that were so completely studied in the reservoirs of the Boston Water Works a number of years ago. These phenomena may be described briefly as follows:

During the summer the water in the reservoir becomes thermally statafied, with the colder and denser water at the bottom and the warmer and lighter water near the surface. During this period, which has been described as the "period of stagnation," only the water in the upper strata is agitated by the wind and is "in circulation." The water near the bottom is stagnant. Under these conditions this quiescent water does not change in quality if the bottom of the reservoir is clean. If, however, there is a deposit or organic matter at the bottom it will undergo putrefactive changes. The water in the stagnant layer will lose its oxygen, and after this is gone decomposition will take place under anaerobic conditions, the water becoming charged with ferrous compounds of iron, carbonic acid, hydrogen sulphide, etc. In the autumn, as the temperature of the water cools to a point approaching that of the bottom the circulation of the upper layers will extend to greater and greater depths until finally it will be complete throughout the entire vertical.

The bad water at the bottom will thus be mixed with the rest of the water in the reservoir, causing the entire body to deteriorate and furnishing food material for heavy growths of diatoms and other microscopic organisms. During the winter season, when the reservoirs are covered with ice, there is a second period of stagnation. This time, however, the thermal conditions are reversed, the warmer water being at the bottom and tending to approach the temperature of maximum density, that is 39.2 degrees Fahrenheit (4 degrees Central). The winter stagnation is of shorter duration than the period of summer stagnation, and the phenomena are less pronounced. To a slight extent the effects of stagnation in the reservoirs may be obviated by drawing water from the lower gates, but the diameter of the circle of influence of the outward current from the lower gate is unknown. The effect of drawing off the stagnant water upon the reservoirs further down stream must also be considered. This water rapidly becomes oxidized, however, in the "fountains" and raceways below the dams. Diagram No. 4 shows the temperature of the water at different depths in several of the storage reservoirs during the summer stagnation of 1903.

If the reservoirs had been stripped of their vegetation and top-soil before they were filled it is probable that the growth of objectionable organisms would have been materially less; and the citizens would have been furnished with more palatable water. There is reason to believe, however, that most reservoirs tend to approach a condition of uniformity after long periods of time. The bottom of reservoirs like those on the Croton watershed tend to improve with age, while the bottom of reservoirs which were originally cleaned of their organic matter become more or less covered with deposits from the water, so that the ultimate end in both cases is not greatly different. For reservoirs less than ten or twenty years old, however, the advantage is all with those from which the soil was stripped, and when the water is not to be filtered the gain to be derived from stripping is well worth the added expense. All conditions must be considered, however. It might be ill-advised, for example, to strip the soil from a reservoir situated below a large swamp, or a reservoir fed by a stream from an unstripped reservoir above it. It is true, however, that satisfactory surface water can be obtained only from clear watersheds and clean reservoirs.

To what extent it may be considered wise to attempt to rectify the existing conditions in the storage reservoirs at the present time is a matter which depends largely upon the plans for the additional supply. If a general filtration project is undertaken, comparatively little need be done to the reservoirs, as filtration would render the present supply satisfactory. There is no doubt, however, that the removal of deposits of organic matter from Croton lake would be of great benefit even if filtration were adopted, as the lessened algae growths would enable the filters to be more satisfactorily and economically operated. In the case of the New Croton Dam it would appear to be highly desirable to have at least the vegetation destroyed from the area to be flooded, and a careful study of the top soil should be made to determine the wisdom of its removal before the reservoir is filled.

The effect upon the quality of the water in the city attendant upon the initial decomposition of the organic matter in this immense reservoir is one which cannot be contemplated without the greatest anxiety. The fact that all the water from the watershed would have to pass through this reservoir before reaching the city adds to the gravity of the situation.

The bad odors which are noticed at times in the City water do not all originate on the watershed. It often happens that the water reaches the One Hundred and Thirty-fifth Street Gate House in good condition and becomes foul in the reservoir in Central Park. The table on page 34 shows that the microscopic organisms are much more abundant at the outlet gate houses of the three basins than at the terminus of the Aqueduct. This was even more noticeable in 1902 than in 1903, as shown by the following figures:

Number of Microscopic Organisms (Number of Standard Units Per C.C.)

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
One Hundred and Thirty-fifth Street Gate House	2,400	564	2,303	792	....	146	1,756
Central Park, new reservoir	2,338	4,482	2,512	1,178	....	237	1,939
Central Park, old reservoir, north basin	6,252	4,426	4,363	2,489	....	507	3,611
Central Park, old reservoir, south basin	4,304	4,166	3,525	2,083	....	292	2,874
Tap at City Hall square	....	752	1,674	1,171	....	232	957

Table No. 9 gives in detail the results of the microscopical examination of the samples collected from the outlet gate house of the north basin of the Old Central Park Reservoir, from July, 1902, to October, 1902. They serve as an illustration of the relative numbers of the different organisms present. During the summers of both years the odor of the water at the outlet of this basin was stronger than at the inlet.

The Central Park reservoirs are from 20 to 36 feet deep, and their capacity is such that the water remains in them for four or five days. The basins have not been cleaned for many years, and there must be considerable deposits of mud at the bottom. Calculation shows that with an average of 200,000,000 gallons of water a day passing through the reservoirs there would be a solid deposit of .12 of an inch in the reservoir every ten years for every part per million of suspended matter deposited. This is on the assumption that the sediment has the same specific gravity as sand, i. e., 2.65, and settles into a mass which has 40 per cent. void space. As a matter of fact the sedimentation, though not exactly known, probably amounts to several parts per million, and the sediment has a specific gravity considerably lower than that assumed. In all probability the deposit amounts to an inch or more in depth every ten years. This is a striking contrast to the sedimentation basins of the St. Louis water supply, where the sediment forms a deposit of several feet annually. It is not the amount of sediment that interests us in this instance, however, so much as its character. It is largely organic and contains many cells of microscopic organisms in a resting state. These basins have become so thoroughly seeded with algae, protozoa, etc., that these organisms appear annually in the reservoirs regardless of the character of the influent water. There seems to be no practical way to prevent them but to empty the basin and remove the spore-laden mud.

Unfortunately the reservoirs are not provided with by-passes, and the risks attendant upon putting any one of them out of service at the present time are perhaps too great to warrant the undertaking. As soon, however, as the Jerome Park Reservoir is ready for use the cleaning of the Central Park Reservoirs should be no longer delayed. Especially will it be important to have these reservoirs cleaned before the introduction of filtered water. To pass filtered water through them in their present condition would be only to invite trouble. If the reservoirs were provided with suitable by-passes it might be possible to isolate one or another of the basins should they become affected with anabaena, for instance, and allow the water to pass around them, just as is done in Brooklyn.

When the water leaves the reservoirs and flows through the distribution pipes many of the microscopic organisms become disintegrated. This accounts for the smaller numbers of organisms in the tap at City Hall square, shown on the table on page 34. The disintegration sometimes increases the odor of the water by liberating the oil globules, and on occasions it may impart a faint opalescence to the water.

Although the blue-green algae are most heavily responsible for the bad odors in the Croton water, the most serious trouble in recent years was caused by synura, one of the protozoa.

During November, 1900, the water in the City had a strong fishy taste and odor, and microscopical examinations made at that time showed the presence of those organisms in comparatively large numbers. Thus, on November 23, a sample of water collected at the Manhattan terminal of the Brooklyn Bridge contained 450 standard units per cubic centimetre of synura, while on November 27, a second sample from the same place contained 300 standard units. At this time there was no other organism present which was capable of producing this fishy odor. When it is remembered that this organism disintegrates rapidly when subjected to pressure in the pipes of the distribution system, it may be readily conjectured that the numbers of synura in the waters of Central Park were very large.

The microscopic organisms have another effect on the water supply system which ought not to be overlooked. They serve as food for the various animal organisms which dwell upon the insides of water pipes and which are often described under the name of "pipe-moss." Examination has shown that the fresh water sponges, spongilla and meynia, and the bryozoa, paludicella and pectinatella are by no means uncommon in the distribution pipes of New York. They are objectionable because they materially clog the pipes and decrease their carrying capacity; they facilitate tuberculation, and they act as a nidus for many little animals such as snails, shrimp, crustacea, etc., which occasionally appear in the tap water, to the consternation of the consumers. Sometimes they become detached in large tufts, when they are liable to clog up house services. These various pipe-dwellers are absolutely dependent upon the microscopic organisms, and they are not found in ground water systems. To permit the growth of algae in the Central Park Reservoir, therefore, is to foster these objectionable sponges and bryozoa in the pipes of the City.

Sanitary Quality—Pollution of Watersheds—The Croton river watershed above the old dam has an estimated population of about 10,000, or about 52 per square mile. This is nearly all rulal in character. The people live in scattered farms or in small villages, and there are only a few large towns. The relative stability of the population is shown by Diagram No. 6. The watershed contains no cities. There is but one sewerage system, and this is a small one in the village of Brewster. The sewage, which in dry weather amounts to 4,000 gallons per day, is disinfected by means of an "electrozone plant," and then allowed to discharge into the ground through a system of tile pipes. Tests made by the Health Department several years ago showed that this plant was doing effective service, and a recent test made at Mount Prospect Laboratory gave similar results. A sewage disposal system for the village of Mount Kisco is in contemplation, and its installation should be made at the earliest possible date. The close proximity of this growing village to Croton lake makes it the most serious source of pollution now existing on the watershed. At the present time the privies and cesspools at Mount Kisco are frequently and regularly cleaned under a local contract. At Lake Mahopac, there are several large hotels which are occupied during the summer by nearly one thousand people. There are a few large institutions, like the Montefiore Home at Bedford, which are provided with independent systems of sewage disposal. Obviously on a watershed of 338 square miles nuisances may be found. Danger from them, however, may be eliminated to a considerable extent by proper attention. During the past year an Assistant Engineer has given his entire attention to existing nuisances, making maps showing their location and describing each one in detail. This work, which is receiving the hearty co-operation of the Department of Health of New York and also of the State Department of Health, is already bearing fruit, and many of the worst nuisances are being abated. Until the Croton water is filtered, this sanitary patrol of the watershed should be diligently pursued. In matters of this character it is emphatically true that "eternal vigilance is the price of safety."

It has been the policy of The City of New York in the past to remove pollution from the watershed by the wholesale purchase of property along the streams. While this has involved a large expense, it has been of unquestioned value to the health of the City. Studies of population statistics for those towns which are included in the Croton watershed show that since 1850 the population has increased scarcely any.

The distribution of the population on the watershed is shown on Table 1A, where Column 11 gives the population per square mile on the watersheds tributary to the different storage reservoirs. In the case of reservoirs on the lower stream, which include areas tributary to reservoirs higher up, these latter are not included in the column mentioned. In Column 12, however, they are so included. It will be seen that except on the watershed of Lake Gleneida, and of Lake Mahopac during the summer, the population per square mile is comparatively low. The village of Carmel is situated near Lake Gleneida, but in spite of the density of population per square mile, the sanitary conditions are not serious.

The density of population is lower in the upper watersheds, such as Boyd's Corner Reservoir, Middle Branch Reservoir, West Branch Reservoir, and Sodom Reservior, than on the lower watersheds like Muscoot Reservoir, Titicus Reservoir, Cross river, Mt. Kisco river and Croton lake.

Typhoid fever is not common on the Croton watershed. As nearly as can be learned from the published records of the State Department of Health, the average death rate from typhoid fever during the past six years has been about 34 per 100,000. This is equivalent to about 17 deaths per 1,000 square miles.

The Croton water has one great safeguard against danger from infection, namely, its large storage reservoirs. It is a fact generally admitted by bacteriologists that the germ of typhoid fever does not multiply in water under conditions of laboratory experiment, and presumably it does not multiply in water under natural conditions. It lives in water, to be sure, sometimes for many months, but in ever decreasing numbers. Laboratory experiments upon the longevity of B. typhi have given somewhat discordant results, partly on account of differences in the vitality of the bacilli employed and partly because of different environmental conditions. Yet, in spite of this, the experiments present a general similarity. They show a rapid initial decline in the number of bacilli after inoculation, followed by the continued life of the more hardy individuals, terminating finally in the apparent death of all. In diagram No. 6 the results of a number of the most carefully conducted experiments have been assembled, and a mean curve drawn to represent the general results.

This line, of course, does not exactly express the decrease in the number of typhoid fever germs in nature in any particular case, but it tells in a general way what effect an unfavorable environment has upon them. It will be seen that time is a safeguard against an infected water. A water ten days after infection is perhaps one-sixth as likely to cause disease as that water one day after infection, while one month is perhaps only one-fiftieth as great. The value of long storage is thus evident. Furthermore, sedimentation and other factors are at work in storage reservoirs to materially reduce the danger from an infected water.

From Table No. 1 it will be seen that the storage reservoirs of the Croton system are from 0.75 to 4.80 miles long, and hold from 165 to 10,000 million gallons, while they are from 14.3 to 24.6 miles distant from the lower end of Croton lake and 45 to 55 miles distant from the One Hundred and Thirty-fifth street gatehouse, at the lower end of the aqueduct. They are so situated, also, that in several cases the water from the most distant reservoirs has to pass down through a lower reservoir, and then through Croton lake, before entering the aqueduct, while the water remains in some of the reservoirs for weeks and months before being used. The reservoirs in Central Park increase the storage by several days, so that the time factor is an important one in protecting the City, should the water at any time become infected. It is evident, too, that the lower portions of the watershed are those which should be most carefully protected against infection.

While the Croton supply may be considered as fairly safe at the present time, yet it must be borne in mind that a surface water supply of this character is always open to infection, and no such supply can be considered as absolutely safe until supplemented by filtration. The standards of purity for public water supplies are becoming more and more rigorous, and the time will soon come, if it is not already here, when the citizens of New York will demand the filtration of all the surface water supplied to the City.

Bacteriological Examination—In a water supply like that of the Croton the number of bacteria is subject to great fluctuations. The soil is the great repository of bacterial life, and every rainfall that washes the surface of the ground carries countless millions of bacteria into the streams. Hence, after every rain the number of bacteria in the water supply increases. This is very evident from Plate No. 4. The heavier the rainfall the larger in general will be the number of bacteria found. A rain falling after a long drought, however, has a much greater effect than the same amount of precipitation at the end of a rainy period. For example, the rain which fell on June 9, 1903, caused a far greater increase in the number of bacteria than the rain which fell on June 30. A high wind, which stirs up the reservoirs, also causes an increase in the number of bacteria. Speaking generally, however, the number of bacteria in the Croton water measures the amount of surface wash into the stream, and hence the chance of infection.

Diagram No. 7 shows in condensed form the relative number of bacteria in the water of the distribution system at different seasons of the present year. The influence of the spring freshets is plainly seen, as well as the effect of the heavy rains in June.

The diagram shows how the numbers of bacteria are reduced by storage in the Central Park Reservoir and how they become further reduced in the distribution pipes. The average number of bacteria in the tap water at City Hall square, Manhattan, from January 1 to September 30, 1903, was 370 per cubic centimeter, but the number varied

at times from 80 to 7,000. The average reduction of bacteria by storage in Central Park was as follows:

	Percentage Reduction of Bacteria.
Central Park, new reservoir	29
Central Park, old reservoir, north basin	58
Central Park, old reservoir, south basin	47
Average	45

The tap at City Hall, where the samples are collected, is supplied by the mains from the New Reservoir, and the reduction of bacteria between Central Park and City Hall square is found to be about 29 per cent. The tap water at City Hall square, therefore, contains only about one-half as many bacteria as the water at the One Hundred and Thirty-fifth Street Gate House.

The bacteriological examination of the various reservoirs and streams on the watershed is not sufficiently complete at present to warrant the publication of generalized results.

When the numbers of harmless water bacteria increase in the supply the chance of there being pathogenic bacteria present is proportionally increased.

This is illustrated by the increased abundance of the intestinal bacterium, bacillus coli, after heavy rains, as shown by Plate 4. The relation between the abundance of bacillus coli as indicated by the presumptive tests and rainfall is not, however, as close as that between rainfall and the total number of bacteria. Detailed results of the tests for bacillus coli show that out of 201 samples from the One Hundred and Thirty-fifth Street Gate House collected between January 1 and September 30, 1903, 18 (or 9 per cent.) gave positive tests when tested in 0.1 c.c.; 36 (or 18 per cent.) gave positive tests in 1 c. c., and 55 (or 27.5 per cent.) gave positive tests in 10 c.c. The reduction in the number of bacillus coli in the reservoirs and distribution pipes was even greater than that of the water bacteria. Thus, at the tap at City Hall square, out of 206 samples, 2 (or 1 per cent.) gave positive tests in 0.1 c.c.; 7 (or 3.5 per cent.) gave positive tests in 1 c.c., and 18 (or 9 per cent.) gave positive tests with 10 c.c.

The direct relation between the sanitary quality of the water as revealed by analysis and the typhoid-fever morbidity is one that is difficult to establish. At times, however, indications of it are seen. Thus from Plate 4 it will be seen that during the middle of March there was a decided increase in the number of reported cases of typhoid fever, and that this was just about two weeks after there had been a great increase in the number of bacteria. This difference in time is just about sufficient to allow the disease to make itself evident. Again, during the first week in July there was another decided increase in the number of reported cases, which followed about two and a half weeks after a period when bacillus coli were unusually abundant in the water.

Chemical Qualities—Croton Water. The determinations of the free ammonia, nitrates, nitrites, etc., offer but little evidence as to the sanitary quality of the water, on account of complications due to the presence of the microscopic organism. This is shown by Diagram , where the lines representing these quantities do not appear to follow either the bateriological examination or the typhoid fever morbidity.

The amount of organic matter, as revealed by the albuminoid ammonia, is higher than is desirable, but is no higher than might be expected from the number of microscopic organisms present.

The amount of chlorine in the water affords a slight basis for ascertaining the general amount of pollution, provided the normal chlorine for the watershed be known. For the Croton Watershed this may be estimated as about 1.6 parts per million. The average amount of chlorine in the water delivered to the City is 1.9 (average of weekly analyses for One Hundred and Thirty-fifth Street Gate House and City Hall tap). Mr. F. P. Stearns, C. E., long ago calculated that for every twenty persons per square mile inhabiting a watershed there would be an excess of chlorine above the normal of 0.1 parts per million. The population on the Croton Watershed is fifty-two per square mile, which would give by calculation 0.25 parts per million excess of chlorine, a figure which agrees with the observed amount within the limit of error of the observation.

The only chemical characteristic of the Croton water which deserves extended consideration is the hardness. The amount of iron in the water is small, the average of the weekly analyses at the One Hundred and Thirty-fifth Street Gate House showing only 0.28 parts per million, and the maximum being only 0.60. About one-half of it is precipitated in the Centarl Park Reservoir, so that it does not reach the consumers.

Hardness—The water on the Croton River watershed differs considerably in hardness in different sections. It is much greater in the extreme northeastern portion, where there are deposits of limestone, than in the northwestern part, where there are no such deposits. In White Lake, for example, the average hardness from February 1 to September 1, 1903, was only 14.7 parts per million, while in the stream at DeForest's Corners above the Sodom Reservoir the hardness was 66.4. The hardness determinations for the different reservoirs are given in Table No. 5A.

It will be noticed that the average hardness of the water in the east branch of the Croton river at DeForest's Corners for the period mentioned was 66.4, while at the lower end of the East Branch (Sodom) Reservoir, into which this stream flows, it was 47.6 at the surface and 44.3 at the bottom, or about two-thirds of that in the stream. This is due to the fact that the water in the reservoir represents to a great extent the spring flood flow, when the hardness of the surface water is below the average. The seasonal changes in the hardness in this region is illustrated by the following table:

Hardness.

Date.	East Branch Stream at DeForest Corners.	Sodom Reservoir. Surface.	Sodom Reservoir. Bottom.
February 11	48.5	45.5	36.5
March 17	45.5	39.0	36.5
April 21	64.5	43.0	45.5
May 19	89.0	53.0	48.5
June 2	94.0	55.5	54.5
June 29	57.0	45.5	40.5
August 31	51.5	51.5	48.5

The hardness of the water in Lake Gleneida and in Branch Brook below Mt. Kisco appears to be higher than would be expected from the geological conditions, and it is probable that their excess is due to the effect of the population dwelling upon those watersheds. This idea is supported by the fact that the chlorines are somewhat above the normal.

The average hardness at the lower end of Croton Lake during the period mentioned was 39.4 at the surface and 39.8 at the bottom, these figures being based on monthly determinations from February 1 to September 1. The average hardness at the lower end of the aqueduct at One Hundred and Thirty-fifth Street Gate-House, from January 1 to September 1, 1903, was 37.4. The seasonal changes in hardness are shown by the following monthly averages:

Average Hardness at One Hundred and Thirty-fifth Street Gate House.

Month (1903).	Parts Per Million. Alkalinity.	Parts Per Million. Parmanent Hardness.	Parts Per Million. Total.
January	32.0	6.6	38.6
February	26.6	10.8	37.4
March	28.2	4.3	32.5
April	30.2	5.8	36.0
May	36.0	1.6	38.4
June	34.2	2.7	36.9
July	39.2	2.5	41.7
August	35.2	2.4	37.6
Average	32.7	4.7	37.4

These figures are slightly below the average for the past fifteen years, as shown by the following figures kindly furnished by the Department of Health:

Average Hardness of Croton Water.

Year.	Parts Per Million.	Year.	Parts Per Million.
1888	36.5	1897	44.9
1889	40.0	1898	45.8
1890	42.0	1899	39.7
1891	43.0	1900	42.4
1892	49.0	1901	39.8
1893	41.3	1902	34.9
1894	41.7	1903 (eight months)	37.4
1895	42.5		
1896	41.1	Average (1888-1902)	38.9

Comparison of these figures with the rainfall and run-off data does not show any very definite relation. In 1892, when the hardness reached its highest annual average, the rainfall was comparatively low, yet in 1898, when the next highest average hardness was obtained, the rainfall was high. The years when the hardness fell below 40, however, were years of high rainfall. The records of the Department of Health show that the maximum hardness of the Croton water often exceeds fifty parts per million.

The following figures give the extreme limits of hardness during recent years:

Year.	Hardness. Minimum.	Hardness. Maximum.	Hardness. Average.
1897	40.7	49.2	44.9
1898	41.4	55.5	45.8
1900	31.2	56.7	42.4
1901	19.6	55.2	39.8

These show that ordinarily the maximum hardness in any year is about 23 per cent. higher than the average hardness, although it may be nearly 37 per cent. higher. From this latter ratio it is estimated that the absolute maximum hardness of the Croton water is probably about 67 parts per million.

The hardness of the Croton water is due very largely to the carbonates of the alkaline earths, and not to any considerable extent to the sulphates, nitrates, etc. In other words, it is temporary hardness and not permanent hardness. It is the latter which is of especial importance in connection with use in boilers. This is shown by the fact that the average alkalinity, which represents the carbonates and bicarbonates, from January to September, 1903, was 32.7 out of a total hardness of 34.7, the difference of 4.7 being the hardness due to sulphates, etc. At this ratio the average annual permanent hardness would be about 5 parts per million. The sulphates appear to be somewhat higher during the winter than during the summer, and occasionally are higher than 10 parts per million. For comparison of the hardness of the Croton water with that of the Brooklyn supply, see page 124.

High Service Supply—The character of the water supplied to the high service districts of Manhattan resembles the water at the One Hundred and Thirty-fifth Street Gate House more than that from the outlets of Central Park reservoir. The water passes so rapidly through the reservoir and stand-pipe at High Bridge that the influence of storage is comparatively slight.

Quality of the Water Supplies of the Borough of Bronx.

The main water supply of the Borough of The Bronx is derived from the Bronx and Byram rivers. The combined drainage areas of these streams above the point from which the supply is taken is about 20 square miles. The water is impounded in Byram Lake, Rye Pond, and the Kensico Reservoir. From the lower Gate-house of Kensico Reservoir, a 40-inch pipe-line conducts it to the distribution reservoir at Williamsbridge. The southern section of the Borough is supplied with Croton water. The eastern section of The Bronx is supplied by the Westchester Water Company. This company operates two pumping stations, one at Glen Park, which takes water from the Kenisco pipe-line, and the other at Pelham, which takes water from driven wells. The extreme northwesterly corner of the Borough is supplied by water furnished by the City of Yonkers. This is a mixed surface and ground water supply.

Bronx and Byram System—The turbidity of the water entering the Williamsbridge Reservoir, as shown by samples collected between March 1 and September 1, 1903, has varied from 0 to 12, the average being between 3 and 4. The color has varied from 13 to 30, the average being 20. The odor has been persistently vegetable. At the outlet of the present reservoir the water has been practically the same in its physical characteristics as at the inlet.

No important growths of microscopic organisms occurred during the year, either in the storage reservoirs or the distribution system. This is evident from the following figures:

The average number of bacteria for the period was 210 per c. c., the extremes being 20 and 380. Out of 26 samples tested for B. Coli, 3 per cent. gave positive results when tested with 0.1 c.c.; 12 per cent. when tested with 1 c.c., and 23 per cent. when tested with 10 c.c.

The average amount of chlorine during the period mentioned was 2.2 parts per million, which is scarcely any, if at all, higher than the normal for the watershed, this normal being slightly higher than that for the Croton watershed, because near the seacoast. The average amount of albuminoid ammonia was 0.114 parts per million; the free ammonia, .040, the nitrate .003, and the nitrates 0.10. These figures do not differ materially from those for the Croton supply.

As in the case of the Croton water, the hardness is the only chemical characteristic which deserves consideration. The average amount of iron in the water is very small.

The watersheds of The Bronx and Byram system are adjacent to the Croton watershed, but the region is off the line of the railroads, and no large villages are included within them. The population is only 34 per square mile, and except for a few nuisances the watershed is in excellent condition from the sanitary standpoint. This condition is reflected in the low typhoid fever death rate in the Borough.

The water from Kensico Reservoir is comparatively soft. The average hardness from February 1 to September 1, 1903, was 26.4, of which 21.8 was temporary (as shown by the alkalinity), and 4.6 permanent, these figures being based on monthly determinations. The more frequent analyses made at the lower end of the aqueduct at Williamsbridge gave the following figures:

Month (1903).	Parts Per Million. Alkalinity.	Permanent Hardness.	Total Hardness.
February	19.0	0.5	19.5
March	18.4	8.2	26.6
April	17.5	6.5	24.0
May	18.5	7.5	26.0
June	22.4	3.4	26.0
July	22.0	6.2	28.2
August	24.8	3.7	30.5
Average	20.4	5.4	25.8

Westchester Water Company—The water pumped at the Glen Park pumping station is taken from the Kensico pipe line and agrees in quality with the water at the Williamsbridge Reservoir. The water from the driven well station of the Westchester Water Company is hard. The average hardness from February 1 to September 1 was 123 parts per million, of which 43 was due to sulphates, etc. This water also had an average chlorine content of 53 parts per million, indicating contamination by sea water. Aside from these objectionable mineral constituents, however, the water is of good quality.

Supply from Yonkers—The water furnished by the Yonkers Water Works is a mixture of surface and ground water. The surface water is taken from the Grassy Sprain Reservoir, and the ground water from a system of driven wells. The safety of the supply is well attested by the typhoid fever death rate of the City of Yonkers, which during the years 1888 to 1901 averaged 11.2 per 100,000 inhabitants.

The samples which have been collected from this supply have shown an average turbidity of 2, an average color of 10, and in general have given a satisfactory analysis. The surface water from the Grassy Sprain Reservoir had in 1903 an average hardness of 34.5 parts per million, only 2.2 of which was "permanent." The ground water, however, is hard. On May 17, 1903, the hardness was 155 parts per million, of which 40 was due to sulphates.

Quality of the Water Supplies of the Borough of Brooklyn.

The chief water supply of the Borough of Brooklyn, namely, that from the Ridgewood system, may be considered as reasonably safe under ordinary conditions; occasionally turbid, but seldom high-colored; with a persistent vegetable odor which at times becomes aromatic and fishy; reasonably soft, but with relatively high sulphates, nitrates and chlorides, which make the water somewhat unsatisfactory for boiler uses; high enough in iron to cause precipitates in the distribution pipe, but not high enough to cause trouble otherwise than by the occasional disturbances of these precipitates. Although the analyses indicate that ordinarily the water is safe and wholesome, yet the large and increasing population on the watershed, the "flashy" nature of the streams, the small size of the supply ponds, the lack of large storage reservoirs and the short time required for the water of the streams to reach the City are facts which cannot be viewed other than with feelings of insecurity.

Ridgewood System—The main water supply of the Borough of Brooklyn is derived from Long Island. The watershed occupies a position on the southern slope of the island east of the City and includes portions of the Counties of Queens, Nassau and Suffolk (a small portion of the drainage area of Massapequa stream extends into Suffolk County). It has a drainage area of approximately 162 square miles. It includes about a dozen comparatively small streams flowing in a general southerly direction toward the Atlantic Ocean. A series of ponds or small storage reservoirs has been formed by constructing dams across these streams. A conduit which extends in an easterly and westerly direction from Ridgewood to Massapequa collects the waters thus impounded. This surface supply is supplemented by fifteen driven well stations also located along the lines of the conduit. That portion of the watershed east of Rockville Centre is known as the New Watershed, and that portion west of Rockville Centre is the Old Watershed. The water from the New Watershed is repumped at Millburn. East of Millburn Reservoir there is a single conduit, but between Millburn Reservoir and Ridgewood there are, in addition to the conduit, two pipe lines. At the main pumping station at Ridgewood there are two sets of pumps, one on the north side and the other on the south side of the Long Island Railroad. The distribution reservoir at Ridgewood comprises three basins, Nos. 1, 2 and 3. The north side pumps take water from the conduit and deliver it into Basin Nos. 1 and 2, while the south side pumps take water from the conduit and pipe lines and deliver it into Basin No. 3. The water pumped at the south side, therefore, contains a slightly larger proportion of water from the New Watershed than the water pumped at the north side. With the exception of Hempstead Storage Reservoir, the supply ponds are very small and shallow, but the watershed is of such a sandy character that the amount of underground storage is very great. In fact, except during periods of flood, a very large proportion of the water flowing in the streams is in reality ground water.

The wells at the different driven well stations penetrate the sand layers to different depths. Those wells which terminate above the clay strata are generally referred to as "shallow wells." Those which penetrate the clay strata are known as "deep wells." Various data concerning the different streams and wells may be found below. The low service system of the borough is suplied directly from Ridgewood Reservoir. The high service sections, which are located not far from Prospect Park, are supplied from Mt. Prospect Reservoir and standpipe, the water being taken from one of the mains and repumped at the Mt. Prospect Pumping Station.

In addition to the Ridgewood supply, there are eight independent supplies in the borough, three of which are owned and operated by the Department of Water Supply, Gas and Electricity. They are all ground-water supplies. The New Lots Station supplies the Twenty-sixth Ward of Brooklyn, which is known as East New York. The Gravesend and New Utrecht Stations supply a large area of the southern portion of the borough. The Flatbush Water Company supplies the Twenty-ninth Ward of Brooklyn, known as Flatbush. The German American Water Supply Company, the Phalzgraf and the Blythbourne Water Supply companies furnish water to relatively small sections of the borough. In addition to those mentioned, there is a water supply in Prospect Park which is used by many people during the summer.

Turbidity—The turbidity of the water yielded by the entire system, as represented by samples collected at the Ridgewood Pumping Stations, is ordinarily low, except after heavy rains. It was not until the year 1900 that the turbidity of the water was expressed in figures, but since then observations have been regularly made. The average turbidity of the water at the North Side Pumping Station for the years 1900, 1901 and 1902 was 4 and at the South Side it was 3. The North Side Station receives a larger percentage of water from the western portion of the watershed, which is usually more turbid than that on the eastern portion, as shown by the following figures:

Table Showing the Minimum, Maximum and Average Turbidity and Color of the Water in the Supply Ponds for the Years 1900 to 1902.

	Turbidity. Min.	Max.	Aver.	Color. Min.	Max.	Aver.
Massapequa Pond	....	4	1	5	172	40
Wantagh Pond	....	6	2	2	55	18
Newbridge Pond	....	4	1	6	75	26
East Meadow Pond	....	20	2	6	56	25
Millburn Pond	....	28	2	4	74	17
Hempstead Storage Reservoir	1	20	3	....	27	8
Schodack Brook	....	22	2	3	30	11
Hempstead Pond	1	360	3	....	26	11
Pine Pond	1	110	3	2	37	15
Smith's Pond	....	115	3	5	40	18
Valley Stream Pond	1	110	3	6	45	21
Watt's Pond	....	80	4	4	110	19
Clear Stream Pond	1	150	4	2	55	12
Simonson's Pond	1	520	7	2	40	10
Springfield Pond	1	70	6	5	130	24
Baiseley's Pond	4	130	15	9	110	32

The turbidity of the water in the streams rises at times to figures much greater than those given in the table. The reason for the greater turbidity in the western ponds is due to the greater population dwelling upon the watershed, to the larger percentage of cultivated land and to the closer proximity of the roads to the streams. All of the well water is without turbidity as it issues from the ground. In certain cases, when it is charged with iron, however, this percipitates on standing so that the water is turbid by the time it reaches the laboratory.

A certain amount of the suspended matter is deposited in the distribution reservoir at Ridgewood and Mt. Prospect, but the turbidity there lost is often more than made up by growths of microscopic organisms, so that the turbidity of the tap water is no less than that of the water at the Ridgewood Pumping Station. This is shown by the following table:

Table Showing the Maximum, Minimum and Average Turbidity and Color of the Water in the Distribution System from 1898 to 1903.

	Turbidity. Max.	Min.	Aver.	Color. Max.	Min.	Aver.
Ridgewood Reservoir— Basin No. 2, influx	65	1	1	32	2	13
Basin No. 3, influx	60	1	3	34	3	13
Basin No. 1, efflux	45	1	3	36	3	12
Basin No. 2, efflux	45	1	3	35	4	13
Basin No. 3, efflux	45	1	4	36	3	14
Mt. Prospect Reservoir	25	1	5	45	2	12
Tap in Mt. Prospect Laboratory	43	1	3	36	3	13
Tap corner Flushing and Clermont avenues	48	1	3	36	3	13
Tap corner Seventh and Flatbush avenues	32	1	3	33	3	13

During the last few years frequent complaints of muddy water have been made in Brooklyn, and investigations have shown that in almost every case this was due to the disturbance of local deposits of iron and organic matter in the distribution mains.

Color—The color of the Ridgewood water is low, but several of the sources of supply have quite a high color, especially those in the eastern portions of the watershed. The color of the water in Massapequa pond, for example, has averaged 40, while at times it has risen to 170. The high color is due to the water which stands in the large swamp just above the pond, and might be eliminated to a great extent by a well-devised system of drainage. The supplies near the centre of the watershed are low in color. A few of the western ponds are somwhat colored, but the waters of Baiseley's and Springfield ponds are not used without filtration, so that what little color the Brooklyn water has may be said to be acquired chiefly from the eastern ponds. All of the well water as drawn from the ground is colorless. The water does not remain long enough in the reservoir to become bleached, so that the color of the water in the city is the same as that at Ridgewood Pumping Station. The average color for five years was 13, an amount too low to be objectionable. The local disturbances of sediment in the pipes above referred to give the water at times an apparent color, due to turbidity.

Odor and Microscopic Organisms—The odor of the water as it enters the Ridgewood Reservoir is persistently vegetable and occasionally earthy or moldy—almost never aromatic, grassy or fishy. The vegetable or peaty odor is due partly to the dissolved coloring matter and partly to the effect of the deposits of organic matter in the shallow supply ponds and in the conduits. The moldy odors when they have been present have been due apparently to the decomposition of this organic matter. The number of microscopic organisms in the reservoir influx water has been uniformly low, and this explains the absence of aromatic, grassy and fishy odors.

The supply ponds when used seldom become infested with growth or microscopic organisms to such an extent as to give the water an objectionable odor, although in several instances this has happened. Heavy growths of synura, uroglena, dinobyron, etc., have at times led to shutting off certain of the ponds.

The following table shows the relative abundance of microscopic organisms in the supply ponds.

Microscopic Organisms in the Supply Ponds.

Pond.	Average Number of Microscopic Organisms (Standard Units per C. C.). *1897.	1898.	1899.	1900.	1901.	1902.	1903.
Massapequa	282	41	72	43	22	58	....
Wantagh	205	35	23	89	7	14	....
Newbridge	71	24	21	15	25	28	....
East Meadow	62	50	26	30	43	19	....
Millburn	105	56	25	28	18	16	....
Hempstead Stge. Reservoir	1,405	566	617	2,640	428	493	....
Schodack Brook	105	31	43	25	18	19	....
Hempstead Pond	172	106	74	236	60	22	....
Pines Pond	27	40	60	196	9	766	....
Smith's Pond	109	105	83	82	87	553	....
Valley Stream	175	170	102	109	18	28	....

Pond.	Average Number of Microscopic Organisms (Standard Units per C. C.). *1897.	1898.	1899.	1900.	1901.	1902.	1903.
Watt's	98	161	68	88	48	33	....
Clear Stream	41	85	64	115	269	14	....
Simonson's	47	37	37	21	97	30	....
†Springfield Pond	852	305	220	1,433	343	424	....
Baiseley's	16,481	4,270	7,332	12,148	758	976	1,814

*August to December.
†Not in use except when filtered.

For several years prior to 1901 no water was drawn from Baiseley's pond on account of pollution, and during this time the blue-green algae (chiefly clathrocystis), developed in enormous numbers. In 1901 the pond was drawn down and the mud removed from a large part of the bottom. The beneficial effect of this cleaning may be seen from the above table.

The following is a list of the microscopic organisms which have been observed in the Brooklyn water at various times. The genera printed in capitals are those which have at times occurred in numbers greater than 100 per c. c. The genera which are starred are those which have been the cause of objectionable odors.

LIST OF MICROSCOPIC ORGANISMS WHICH HAVE OCCURRED IN THE BROOKLYN WATER.

Animal Organisms.

Protozoa—Actinophrys, anthophysa, arcella, BURSARIA, CERATIUM, cercomonas, chlamydomonas, codonella, coleps, colpedium, CRYPTOMONAS, difflugia, *DINOBRYON, enchelya, EPISTYLIS, euglena, *euglypha, glenodinium, halteria, mallomonas, monas, nassula, opalina, paramaecium, peridinium, phacus, raphidomonas, stentor, *synura, tintinnus, trachelocerca, trachelomonas, trinema, UROGLENA, vorticella.

Rotifera—Anuraea, asplanchna, brachionus, conochilus, mastigocerca, notholca, ova, POLYARTHRA, rotifer, synchaeta, triarthra.

Crustacea—Branchipus, bosmina, cyclops, DAPHNIA.

Plant Organisms.

Diatomaceae—Amphora, arthradesmus, *ASTERIONELLA, cyclotella, cocconeis, cymbella, DIATOMA, epithemia, fragilaria, gomphonema, hymantidium, MELOSIRA, meridion, navicula, nitzschia, pleurosigma, stauroneis, stephanodiscus, surirelia, *SYNEDRA, *TABELLARIA.

Chlorophyceae—Botryococcus, chaetophora, coelastrium, CLOSTERIUM, conferva, cosmarium, desmidium, dictyosphaerium, dimorphococcus, docidium, draparnaldia, EUDORINA, gonium, gloeocapsa, hyalotheca, PANDORINA, pediastrum, PROTOCCUS, raphidium, scenedesmus, sphaerozosma, SPIROGYRA, staurastrum, VOLVOX, Xanthidium, Zoospores, Zygnema.

Cyanophyceae—*Anabaena, *APHANIZOMENON, *Chroococcus, *CLATHROCYSTIS, *coelosphaerium, cylindrospermum, merismopedia, *MICROCYTIS, oscillaria.

Schizomycetes and Fungi—Cladothrix, CRENOTHRIX, loptothrix, mold hyphae.

With the exception of the Hempstead Storage Reservoir, the supply ponds are very shallow, the water in the summer being often less than five feet deep. They are supplied largely with ground water. It is not surprising, therefore, that aquatic plants develop vigorously on the bottom and shores of the ponds. Late in the summer it is not at all an uncommon sight to see masses of anacharis, ceratophyllum, potamogeton, utricularia, etc., reaching to the surface of the water and covering great areas near the shores. In the winter these growths die and settle to the bottom. When growing they do not impart a noticeable odor to the water, but they form a nidus for microscopic organisms which are ultimately carried into the conduit, to seed the distributing reservoirs. The aquatic plant masses in the ponds act as natural filters to remove turbidity from the water, but the matter which adheres to them eventually settles to the bottom, and is added to the sediment there. It seems probable that without the presence of this plant life in these shallow ponds the organic matter would not accumulate there as rapidly as it does.

The ground water does not contain microscopic organisms, except genera such as crenothrix, cladothrox, lepothrix, etc., which are capable of living under anaerobic or semi-anaerobic conditions in the driven well tubes. Crenothrix is found at times in nearly all of the well waters, but it is especially abundant in those waters which contain much iron in solution. The well points at many of the stations become practically or wholly clogged after a certain period of service and there is good reason to believe that crenothrix plays an important part in the process by which iron oxide and sand unite to fill the meshes of the strainers. The common form of crenothrix is that which deposits iron in its gelatinous sheath, but in some of the driven wells of the Ridgewood system, a species has been discovered which appears to deposit aluminum instead of iron. (See paper by D. D. Jackson—A New Species of Crenothrix, Trans. Am. Micro. Soc., Vol. XXIII., p. 31, May, 1903.)

It was stated that the water which enters Ridgewood Reservoir contains but few microscopic organisms, and therefore has no odors properly described by the terms aromatic, grassy, moldy, fishy, etc. If this water were delivered to the consumers in the condition at which it arrives at Ridgewood Pumping Station, its physical qualities would be considered as generally satisfactory, except after heavy rains. Unfortunately, however, growths of microscopic organisms occur in the distribution reservoirs at Ridgewood and Mount Prospect, at times, imparting to the water most unpleasant odors, and render it turbid and unsightly. Before the year 1896 these organisms, although known to be present in the supply, did not develop in numbers sufficient to cause trouble. In the summer of that year the tap water became very offensive, and this led to an extensive investigation on the part of the Water Department, conducted by the late Dr. Albert R. Leeds, of Stevens Institute. His investigation plainly showed that the cause of the trouble was the diatom asterionella, which was found in enormous numbers in Ridgewood Reservoir. His microscopical examinations were not begun until the fall of 1896, and from studies since made there is good reason to believe that the odors observed in the early summer of that year were due not to asterionella, but to anabaena. Both organisms, however, developed in the distribution reservoirs, and not on the watershed. The practical result of the investigation was the construction of a by-pass to lead the water around the reservoir when necessary, and the establishment of Mount Prospect Laboratory.

Since 1896 growths of microscopic organisms have continually recurred in the reservoirs mentioned, different organisms appearing and disappearing with the seasons, but by a judicious use of the by-pass the number of microscopic organisms in the tap water has been kept at a comparatively low figure, as shown by the following figures:

Number of Microscopic Organisms.

	Standard Units per C. C. 1896.	1897.	1898.	1899.	1900.	1901.	1902.
Ridgewood—							
Basin No. 2, influx	50	225	105	97	414	55	51
Basin No. 3, influx	4	163	102	76	251	55	74
Basin No. 1, efflux	273	7,793	3,432	4,782	1,426	608	238
Basin No. 2, efflux	62	403	8,669	1,115	1,307	740	1,261
Basin No. 3, efflux	3,650	2,181	1,823	1,672	3,372	790	1,915
Mount Prospect Reservoir	9,824	11,738	8,188	8,891	6,536	3,891	2,935
*Tap in Mount Prospect Laboratory	200	1,320	1,170	859	1,330	461	426
†Tap in Flushing and Clermont avenues	3,840	1,710	1,266	863	1,337	328	449
‡Tap in Flatbush and Seventh avenues	5,730	4,414	3,571	1,786	3,614	1,713	1,125

*Water from Basins Nos. 1 and 2, Ridgewood Reservoir.
†Water from Basin No. 3, Ridgewood Reservoir.
‡Water from Mount Prospect Reservoir.

It will be observed that there has been a gradual reduction in the intensity of the organism growths during the past five years.

The genera which have caused the most trouble are asterionella, anabaena, synedra, melosira, diatoma, chlamydomonas, cyclotella and scenedesmus.

An examination of the figures given in the above table shows that the number of organisms in the City tap have been much less than those in the reservoirs. The taps at Mount Prospect Laboratory and at Flushing and Claremont avenues are supplied from Ridgewood Reservoir, while the tap at the corner of Flatbush and Seventh avenues is supplied from Mount Prospect Reservoir. The latter reservoir cannot be entirely shut off from the supply, hence a larger proportion of the microscopic organisms from that reservoir find their way to the City.

The figures just referred to do not fairly show the difference between the tap water and the water in the reservoir, because they do not distinguish between the organisms which are objectionable and those which are not. The by-pass is used only when the odoriferous organisms are present, as it is advisable for sanitary reasons to take as complete advantage as possible of the limited storage. A better comparison of the water can be made by considering the odor caused by the organisms, and the following figures illustrate this:

Percentage of Samples Which Had Odors Attributable to Microscopic Organisms.

	1898.	1899.	1900.	1901.	1902.
Ridgewood—					
Basin No. 1, influx	..	..	13	..	..
Basin No. 3, influx	..	..	9	..	2
Basin No. 1, efflux	33	45	29	11	2
Basin No. 2, efflux	14	9	32	8	16
Basin No. 3, efflux	17	31	49	10	36
Mt. Prospect Reservoir	81	80	70	27	36
Tap in Mt. Prospect Laboratory	10	32	26	..	..
Tap at Flushing and Clermont avenues	8	14	26	2	..
Tap at Flatbush and Seventh avenues	27	38	34	4	11

Even these figures do not fully show what has been accomplished by the use of the by-pass, as they do not take into account the intensity of the odor. The by-pass is not opened until the number of organisms is found to be sufficient to produce what is termed a "distinct odor."

The regimen of the growths of organisms which occur in the distribution reservoirs in Brooklyn is entirely in harmony with what has been observed elsewhere, and emphasizes the fact that ground water cannot be stored satisfactorily in open reservoirs. Ground waters usually contain an abundance of plant food such as nitrates, carbonic acid, etc., and if stored in reservoirs exposed to sunlight the waters often become affected with growths of microscopic organisms, if once they become seeded. Since this is true, there is all the more danger for growths to occur in mixtures of surface and ground water, the one furnishing the mineral constituents required by the organisms, and the other furnishing organic matter. Such waters, furthermore, have greater chances of becoming seeded with microscopic organisms. It was not until the percentage of ground water in the Brooklyn supply attained a high figure that these organisms began to develop abundantly in the distribution reservoirs, and the indications are that the proportion of ground water will continue to increase until it reaches 100 per cent. In spite of this, however, there is good reason to believe that comparatively little trouble would be experienced in these reservoirs if they could be kept perfectly clean; that is, if deposits of organic matter could be prevented from accumulating on the bottom. For example, the dense growth of anabaena which occurred in Basin No. 2, of Ridgewood Reservoir, during the summer of 1898, led to the basin being emptied and cleaned of its accumulated deposit. The cleaning did not entirely prevent all growths of organisms in the following years, but the anabaena which caused the trouble in 1898 has not since returned.

The use of the by-pass in ameliorating the objectionable conditions occasioned by the growth of organisms cannot be looked upon, however, in the present case as being entirely satisfactory, inasmuch as it greatly shortens the time required for water to pass from the supply pond to the consumers, and thus increases the danger of an epidemic should the water at any point become infected. The reservoir at Ridgewood must be ultimately covered, but this would be so hazardous an undertaking, with the existing limited facilities for storage, that it probably is not warranted at the present time. To make sure that these reservoirs are kept clean and that organisms are not allowed to form deposits on the bottom therefore is imperative. Mount Prospect Reservoir, which supports much heavier growths of organisms than does Ridgewood Reservoir, should be covered at an early date if its use is to be continued. It is situated in the heart of the City, and the water is constantly becoming contaminated by the clouds of dust blown from the street. For sanitary reasons therefore this reservoir ought to be covered. Then the reservoir is so situated with respect to the Park System that some sort of architectural treatment is demanded on aesthetic grounds. The present sharp outlines of the reservoir banks do not harmonize well with the surrounding landscape. If this reservoir could be covered in such a way that its roof could be utilized by the public as a sort of sunset park this commanding spot would become one of the greatest points of attraction in the City. Such a plan would naturally involve modifications in the present embankments, the removal of the superstructure of the present gate-house, the planting of shrubs, trees, etc., the laying out of new pathways and perhaps the construction of a fountain supplied with water from the standpipes. It would appear that this plan is one in which the Department of Water Supply and the Department of Parks should be mutually interested.

The heavy growths of microscopic organisms which have occurred in the distribution reservoirs during the past few years have been the cause of no little fouling of the distribution pipes by growths of fresh water sponge, byrozoa, etc. The relation between microscopic organisms and the so-called pipe-moss has been explained in connection with the Croton supply. The growths of paludicella, however, appear to have been very much greater in the Brooklyn water pipes than in New York. On one occasion when the flow through some of the large mains suddenly reversed, these organisms became detached from the sides of the pipes in such masses that hundreds of water taps in the City were stopped up, and in one or two instances two-inch mains were entirely stopped by the fibrous masses. This is a further argument therefore for doing all that can be done to keep the microscopic organisms out of the distribution reservoirs.

Sanitary Quality—Pollution of the Watershed.

The population on the watershed of the Ridgewood system averages about 208 per square mile, but it varies from 78 to 1,250. The population densities on the different portions of the watershed are shown in Table No. 1. The drainage areas there given are based in part upon data furnished by Mr. Walter E. Spear, Department Engineer of the Long Island Division, and in part upon planimeter measurements of watershed outlines drawn from the contours of the United States Geological Survey atlas sheets. They differ slightly from figures previously published. The populations are based partly upon the census returns and partly upon a count of the number of houses on the watersheds. There is a general decrease in population density from the western to the eastern portions of the watershed, the regions nearest the City being naturally the most thickly settled. There is also in some cases a decrease in population density northward, and this accounts for the lower population densities on some of the larger streams, which extend northward to the backbone of the island. The soil on Long Island is so sandy that many of the streams are non-existent in the upper portions of their watersheds except during the spring flows. An attempt was made to calculate the populations per square mile for the lower portions of the streams, but the results obtained did not appear to possess any advantage over those given in the table, although in some instances, as, for example, Valley Stream, the population densities were increased.

The population on the watershed is rapidly growing, and this growth is destined to increase at a still greater rate in the near future on account of the extension of rapid transit facilities to the suburbs of Brooklyn. Already speculators are purchasing property on the watershed and laying out the sites of future communities. The construction of an immense race track just above Elmont, on Simonson's stream, will serve to greatly increase the population in that region and will be the means of drawing thousands of people there during the summer season. The rapid increase in the population on the watershed of the Ridgewood system, which is in striking contrast with the stability of population on the Croton watershed, is shown by Diagram No. 5.

Except for the village of Jamaica, located upon the watershed of Baiseley's pond, the population is rural in character. Jamaica has a sewerage system which carries the sewage to a point below the conduit where it is to be treated by a special process before it is discharged into the bay. The system is a comparatively new one, however, and many houses near the feeders of the Baiseley pond do not have sewer connections. For a number of years no water has been used from this pond except what has been purified by a system of mechanical filtration.

The next largest centre of population is the village of Hempstead, which is situated only about two miles above the Hempstead Storage Reservoir. This village has no system of sewers, although it should have, even for its own sake. Hempstead stream, otherwise known as "Horse brook" or "Parsonage brook," flows through the heart of the village, and there are many serious nuisances immediately adjacent to the stream. All privies are panned, however, and cleaned by the Department of Water Supply, Gas and Electricity.

The water of the stream under dry weather conditions is not allowed to enter the reservoir, but is carried around and below it through a by-pass and wasted. When the flow of the stream exceeds the carrying capacity of the by-pass, as it sometimes does, the surplus accumulates in a sedimentation basin, and when this is full the water spills into the reservoir. During the summer, when it is necessary to husband all the water resources possible, this basin is allowed to fill and stand for about three weeks, and when time and subsidence have seemed to considerably purify the water the contents are turned into the reservoir. A sand filtration plant is being constructed below the dam to filter the water which is now being wasted through the by-pass and allow it to enter Hempstead pond.

Although there are no other large centres of pollution, there are many nuisances existing along the various streams, especially on Springfield stream and Simonson's stream. The water from Springfield pond had not been used for several years, however, until a mechanical filter was constructed to purify it. A sand filter, to purify the water of Simonson's stream, is also being constructed.

No general attempt was made by the old City of Brooklyn to preserve the sanitary quality of the water by the purchase of property along the stream, although in some instances this was done. On most of the streams the privies which are located near the water are panned, and the pans are emptied weekly by the Department of Water Supply, Gas and Electricity. This serves to mitigate many serious nuisances, although the method itself is something of a nuisance, it being almost impossible to always empty the pans into the collecting cart without spilling some of the offal on the ground.

It will be seen from the data given in Table No. 1 that some of the conditions which tend to reduce the danger from infection of the Croton water are lacking in the Ridgewood system. The watershed is nearer the City, the ponds are small, shallow and adjacent to the conduit, so that the "time-factor" in the destruction of pathogenic bacteria is much less pronounced, and there is less opportunity for efficient sedimentation. Another factor which tends to prevent danger from infection, however, is much more potent than on the Croton watershed, namely, the sandy character of the soil. This is such as to cause almost the entire surface of the ground to act as a sand filter and thus purify the surface water. Indeed there are many reasons to believe that a large part of the water normally flowing in the stream is rainfall which has first passed through the soil. The entire supply of the Ridgewood system partakes of the character of a ground water supply to a very great extent. And it is in this direction that the safety of the water supplies from the Long Island watersheds must be sought. All of the water must be eventually drawn from beneath the surface of the ground. Filtration of some of the surface supplies may prove more economical for some time to come, but the time will eventually arrive when a single filtration will not prove adequate to the task of removing the danger from infection.

During recent years typhoid fever has not been prevalent in Nassau County, as shown by the following figures, compiled from the published records of the State Board of Health:

Typhoid Fever Death Rate per 100,000.

Year.	Nassau County.	Suffolk County.
1894	25.2	32.9
1895	10.5	33.0
1896	16.2	13.5
1897	21.7	17.4
1898	1.9	33.6
1899	9.3	21.4
1900	9.9	20.7
1901	8.8	11.1
1902	15.3	16.6
Average	13.2	21.1

In seeking to ascertain the sanitary character of the Brooklyn water from the analytical results, chief attention must be given to the odors of decomposition, the number of bacteria, the presence of Bacillus coli, the excess of chlorine above the normal and the amount and character of the nitrogen compounds. These are summarized for the supply ponds in the following table, which is based on weekly (in some instances monthly) analyses, covering a period of five years:

Summary of Weekly Analyses.

	Per Cent. of Samples Which Had Odors of Decomposition.	No. of Bacteria Per C. C.	Per Cent. of Samples Which Gave Positive Test for B. Coli with 1 C. C.	Excess of Chlorine Above Normal.	Nitrogen As— Albuminoid Ammonia.	Free Ammonia.	Nitrates.	Nitrites.
Massapequa	2	434	4.3	0.3	.083	.010	.001	0.32
Wantagh pond	2	385	5.5	0.5	.072	.010	.001	0.40
Newbridge	7	172	5.0	0.9	.063	.007	.001	0.41
East Meadow	2	469	7.6	0.4	.065	.016	.001	0.51
Millburn pond	8	417	11.3	1.7	.054	.009	.002	0.19
Hempstead stream	99	3,010	30.0	14.6	.099	.826	.022	3.19
Hempstead Storage Reservoir	16	658	8.0	1.2	.092	.026	.006	1.09
Schodack brook	7	664	13.9	1.0	.043	.020	.003	1.16
Hempstead pond	8	448	6.2	1.0	.072	.037	.003	0.26
Pines pond	7	522	6.9	1.2	.070	.019	.004	0.97
Smith's pond	8	492	7.2	0.8	.070	.024	.003	0.55
Valley Stream pond	9	571	4.5	1.5	.080	.014	.005	1.58
Watt's pond	10	847	10.5	1.6	.068	.026	.004	1.43
Clear Stream pond	21	903	9.4	3.0	.058	.018	.009	4.80
Simonson's pond	49	2,171	9.8	3.3	.061	.025	.012	4.16
Springfield pond	72	1,337	17.0	7.4	.114	.044	.012	2.82
Baisley's pond	55	1,168	10.6	4.9	.287	.072	.010	1.78
Ridgewood Reservoir—								
Basin No. 2, influx	5	375	5.7	*	.044	.029	.003	1.14
Basin No. 3, influx	3	320	5.3	*	.045	.019	.002	1.00
Basin No. 1, efflux	8	379	5.5	*	.066	.018	.004	1.08
Basin No. 2, efflux	3	399	9.0	*	.061	.019	.003	1.07
Basin No. 3, efflux	4	329	4.5	*	.065	.012	.003	0.96
Mt. Prospect Reservoir	3	208	1.5	*	.128	.013	.009	0.82
Tap in Mt. Prospect Laboratory	3	291	4.2	*	.050	.005	.002	1.08
Tap at Flushing and Claremont avenues	2	317	4.1	*	.054	.005	.002	1.04
Tap at Flatbush and Seventh avenues	1	314	1.0	*	.065	.006	.003	1.00

*The excess of chlorine cannot be determined, because of the influence of the sea-water on some of the driven-well water.

The difference in the sanitary quality between the eastern and the western ponds as shown by these analyses is very marked. If the ponds are grouped according to the excess of chlorine above the normal, the following average figures are obtained.

Summary of Analyses, with Sources Grouped According to Excess of Chlorine.

Number of Groups.	Limits of Excess of Chlorine Above the Normal.	Average Excess of Chlorine.	Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.	P. C. of Samples Which Had Odors of Decomposition.	Number of Bacteria per c.c.	P. C. of Samples Which Gave Positive Tests for B. coli in 1 c.c.	Ponds Included in the Group.
I	.0- .5	0.4	.073	.012	.001	0.41	2	429	5.8	Massapequa, Wantagh, East Meadow.
II	.5- 1.0	0.9	.062	.022	.003	0.6L	8	444	8.1	Newbridge, Schodack, Hempstead pond, Smith's.
III	1.0- 2.0	1.6	.073	.019	.004	1.19	10	603	8.2	Millburn, Hempstead Stge. Pines. Valley Stream, Watts.
IV	2.0- 4.0	3.1	0.59	.021	.010	4.48	35	1,537	9.6	Clear Stream, Simonson's.
V	4.0-10.0	6.1	.200	.058	.011	2.30	63	1,202	13.8	Springfield, Baisley's.
VI	10.0-	14.6	.099	.826	.022	3.19	99	3,010	30.0	Hempstead stream, below Hempstead.

These show progressive series representing the chlorine excess, nitrites, odors of decomposition, bacteria and tests for B. coli. The figures for albuminoid ammonia and free ammonia do not fall as regularly into the series, as they are too much affected by organic matter from sources other than those of pollution.

No analyses like these should be interpreted except in connection with the known conditions on the watershed, but when all the facts are considered, the following seems to be a fair classification of the surface supplies of the Ridgewood system:

Reasonably Safe Supplies.

Massapequa pond, Wantagh pond, Newbridge pond, East Meadow pond, Hempstead pond, Smith's pond.

Insecure Supplies.

Millburn pond, Schodack brook, Hempstead storage reservoir, Pines pond, Valley Stream pond, Watt's pond.

Unsafe Supplies.

Clear Stream pond, Simonson's pond (safe when filtered; filter being constructed).

Dangerous Supplies.

Springfield pond (safe when filtered), Baisley's pond (safe when filtered), Hempstead stream below Hempstead (now diverted by by-pass; filter being constructed).

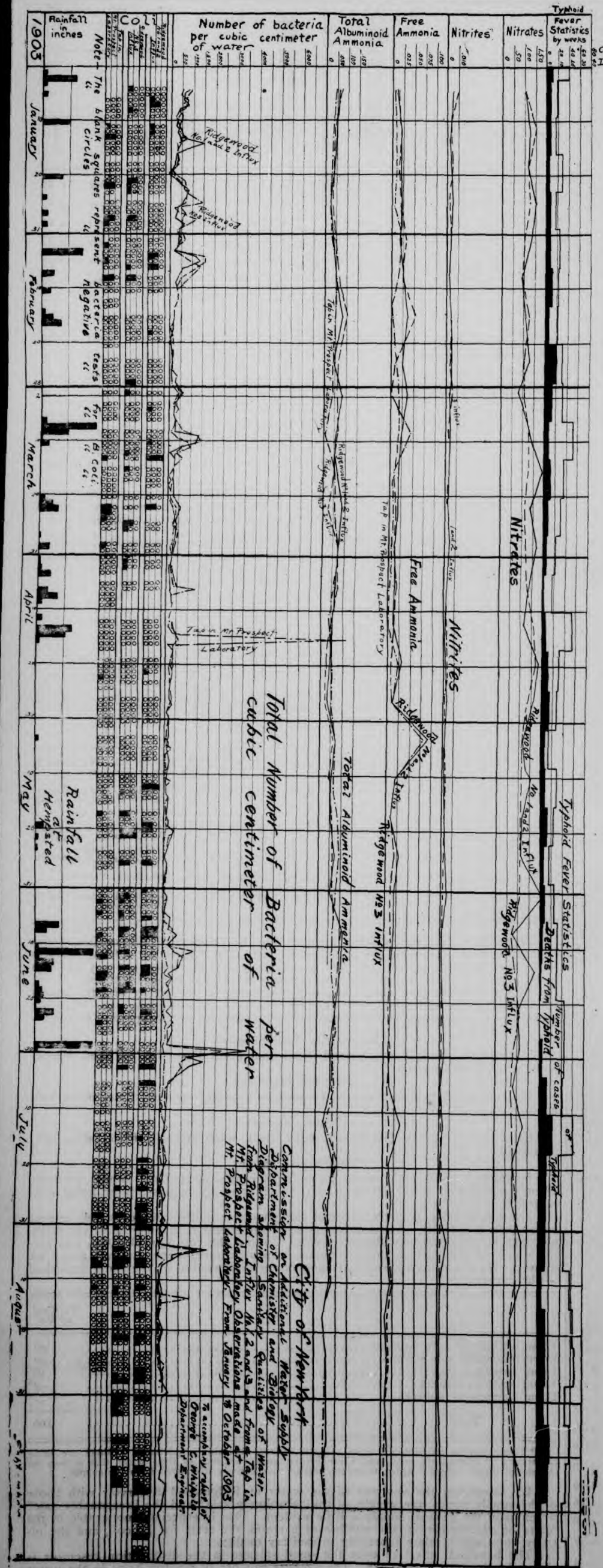
The above table is liable to make the character of the present supply appear worse than it is really. About 40 per cent. of the supply is taken from driven wells, and may be considered as absolutely safe. Taking this into consideration and giving weight to the various surface sources in proportion to their drainage areas, we arrive at the following approximate percentage composition of the water furnished to the consumers:

	Per Cent. by Vol.
From absolutely safe sources	40
From reasonably safe sources	40
From insecure sources	16
From unsafe sources	4*
From dangerous sources	..
Total	100

* These supplies are shut off when analyses indicate that this is advisable. Filters are being constructed at Simonson's pond, and Clear Stream pond furnishes so little water that it may be abandoned. This "unsafe" water, therefore, will be soon entirely eliminated from the supply.

By comparing the analyses of the water at Ridgewood Reservoir with those of the supply ponds, the weight of the "absolutely safe" and the "reasonably safe" water upon the general supply will be evident. This is especially noticeable in the odors of decomposition, the number of bacteria, the tests for B. coli, and the nitrites, tests which relate especially to sanitary quality.

The beneficial effect of even the small storage in the distribution reservoir is shown by the tests for B. coli. The average number of positive tests in the water as it enters Ridgewood was 4; in the taps supplied by Ridgewood Reservoir it was 2.5, and in the tap supplied by Mount Prospect Reservoir it was 1.0.



The variations in the sanitary quality of the water during the year 1903 is shown on Plate No. 5. Just as in the case of the Croton supply, little appears to be learned from the regular chemical analyses, while the number of bacteria and the tests for B. coli fluctuate with the rainfall.

Chemical Character of the Water—Because of the large and increasing proportion of ground water in the Ridgewood system, the chemical character of the water deserves extensive consideration. This may be discussed under the heads of Chlorine, Hardness and Iron.

Chlorine—The Ridgewood watershed is located so close to the sea that the normal chlorine is relatively high. Whereas the normal for the Croton watershed is only about 1.6 parts per million, it is somewhere between 5 and 6 parts per million for the Ridgewood system. This was ascertained by collecting samples of unpolluted water at widely scattered localities over Long Island, and from these data obtained in 1898, a map of normal chlorine* was drawn. During the past year this map has been revised by Mr. Jackson, who has also extended the isochlors over the entire state. His map shows the isochlors corresponding to 4, 5 and 6 parts per million of chlorine.

At the eastern end of the island, and except near the coast, the normal chlorine was below 6 parts per million. On the south shore the isochlor of 6 parts per million was only two or three miles inland, while on the north shore it was three or four miles inland. The isochlor of 5 parts per million is about two miles further from the shore and is parallel with the former. The isochlor of 4 parts per million nearly surrounds an area in the centre of the island from three to five miles square. In the centre of this region the normal chlorine is somewhat lower than 4 parts per million. Several samples in the interior contained as little as 3 parts per million. The normal chlorine at the line of the aqueduct of the Brooklyn Water Supply is about 8 parts per million, but most of the streams cross the isochlor of 4 parts per million, and a few take their rise in a region where the normal chlorine is below 4 parts per million. It seems probable that the normal chlorine for the supply ponds of the Brooklyn watershed is somewhere between 5 and 6 parts per million. At the eastern end of the island the normal chlorine is very high and varies greatly in different localities. In this respect it resembles the normal chlorine found on Cape Cod, Mass.

The following figures show the average amount of chlorine in parts per million in the different sources of supply for a period of five years.

Average Amount of Chlorine in Parts Per Million in the Different Sources of Supply.

Surface Waters.	Chlorine.	Ground Waters.	Chlorine.
Massapequa pond	5.3	Massapequa (deep and shallow)	5.5
Wantagh pond	5.6	Wantagh (deep and shallow)	3.7
Newbridge pond	5.9	Matawa	4.2
East Meadow pond	5.4	Merrick	5.3
Millburn pond	6.7	Agawam	5.0
Hempstead storage reservoir	6.4	Watt's pond (shallow)	7.5
Schodack brook	6.0	Clear stream (shallow)	6.3
Hempstead pond	6.0	Forest stream (shallow)	6.0
Pines pond	6.2	Springfield (deep)	3.9
Smith's pond	5.8	Jameco (deep)	4.8
Valley Stream pond	6.5	Jameco (deep and shallow)	25.7
Watt's pond	6.6	Baiseley's (shallow)	114.9
Clear Stream pond	9.0	Oconee (deep)	4.8
Simonson's pond	8.8	Shetucket (deep)	264.2
Springfield pond	12.4	Spring creek, old plant (deep)	7.1
Baiseley's pond	9.9	Spring creek, old plant (shallow)	139.1
		Spring creek, new plant	55.2

If the water supplied to Brooklyn contained no more chlorine than the normal for the watershed, it could not be objected to on this account. The pollution of the western streams tends to increase the amount slightly, but it is because certain driven wells are affected by sea water that the chlorine in the water is high.

The following table gives the amount of chlorine in the water supplied to Brooklyn from January, 1895, to December, 1902. The figures for 1895, 1896, and 1897 were taken from the published records of the Department of Health. Those from 1898 to 1902 were taken from the records of Mount Prospect Laboratory, and represent the monthly means of weekly analyses of the water entering the Ridegwood Reservoir. These results are shown graphically in Diagram No. 9. The high chlorine during the latter part of 1895 was due to the effect of water from the wells first sunk at Agawam, and which were afterwards taken up and redriven on account of the influence of the salt water. In 1897 the increasing chlorine was caused by excessive draught from the wells at Baiseley's and Spring Creek. During the latter part of 1897 and 1898 a vigorous attempt was made to reduce the chlorine in the tap water by temporarily shutting down the well stations at Baiseley's and Spring Creek, and by disconnecting some of the wells at Jameco. At this time the well water at Shetucket had not become affected by the sea water. The influence of the infiltering sea water at Spring Creek, Baiseley's and Jameco was shown by the following calculation. On September 28, 1897, the records showed that water was being taken from various sources, according to the figures given in column 2. The amount of chlorine for each source is indicated in column 3. Column 4 represents the product of columns 2 and 3. The total product of column 4, divided by the total number of gallons pumped, as shown in column 1, gives 21.39 as the calculated chlorine for the entire watershed on the same date. Observations on the same date showed that the water entering Basins 1 and 2 of Ridgewood Reservoir contained 25.7 parts, and that the water entering Basin 3 contained 17.2 parts per million. The average of these two figures is 21.45, which agrees very well with the calculated results given above. On the same day the water at the Efflux Basin contained 24.6 parts; Basin 2, 21.9, and Basin 3, 19. The average of these is 21.8, which also agrees well with the calculated value. By deducting the figures for Baiseley's and Spring Creek Station, it is found that if these stations had been eliminated the chlorine in the tap would have been 6.76 parts per million, instead of 21.59, and later observations showed that when these stations were shut down this figure was actually reached.

From 1898 to 1902 there has been a gradually increasing amount of chlorine in the water supplied to the city. The fluctuations during this time, however, have been quite marked, and the low points on the profile of Diagram No. 9 represent occasions when the salt wells were temporarily shut down. It will be observed that the profile shows a general tendency to higher chlorine in the fall of the year than at other seasons.

Table No. 5 shows that the wells which are most affected by sea water are those at Jameco, Baiseley's, Shetucket and Spring Creek. These stations will be considered individually.

*See A Normal Chlorine Map of Long Island, by G. C. Whipple and D. D. Jackson, Tech. Quar. Vol. 13, No. 2, June, 1900.

Table Showing the Amount of Chlorine in Parts per Million in the Water Supplied to Brooklyn.

Month.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.
January	11.80	23.00	13.60	10.25	15.30	19.20	17.80	24.10
February	10.75	13.00	14.50	7.30	17.80	17.30	21.35	23.00
March	9.88	12.00	14.30	11.75	16.45	16.45	17.75	19.80
April	10.50	9.80	14.10	17.60	14.45	15.00	16.35	18.65
May	10.55	7.50	15.50	13.80	18.40	16.55	16.25	15.30
June	10.63	8.20	16.20	11.50	18.35	17.15	20.25	20.15
July	16.90	10.10	17.00	10.15	15.85	18.60	21.25	19.90
August	20.63	12.00	18.60	12.00	19.00	15.40	19.40	19.95
September	17.25	12.50	20.60	16.55	19.10	17.55	21.55	20.35
October	17.20	14.00	17.70	18.90	17.40	16.85	22.45	22.10
November	20.00	16.60	13.20	17.20	15.30	22.90	23.50	23.25
December	22.40	15.00	7.20	11.45	17.75	18.00	24.25	15.90

Note—The figures for 1895, 1896 and 1897 were taken from the published records of the Health Department; those from 1898 to 1902 were taken from the records of Mount Prospect Laboratory and represent the average water entering Ridgewood Reservoir.

Calculation to Show the Effect of the Sea Water, from the Driven Wells at Baisley's and Spring Creek Pumping Stations, on the Water Supplied to Brooklyn on September 28, 1897.

1. Source of Supply.	2. Number of Gallons Furnished.	3. Chlorine Parts per Million.	4. Product of Column 2 and Column 3.
Surface waters on the "new watershed"	30,549,900	6.0	183,299,000
Surface gravity supply on "old watershed"	9,116,880	6.5	59,259,000
Smith's pond	6,166,200	5.8	35,763,000
Wantagh Pumping Station	4,073,600	4.1	16,701,000
Matowa Pumping Station	4,074,700	4.4	17,930,000
Merrick Pumping Station	3,870,900	7.2	27,871,000
Watts Pond Pumping Station	2,268,300	6.7	15,198,000
Clear Stream Pumping Station	2,962,000	6.7	19,845,000
Forest Stream Pumping Station	3,640,700	6.0	15,846,000
Jameco Pumping Station (deep wells)	2,455,900	5.2	12,770,000
Jameco Pumping Station (deep and shallow wells)	1,900,000	34.4	65,360,000
Baisley's Pumping Station	2,263,160	144.0	325,872,000
Oconee Pumping Station	2,624,000	4.2	11,021,000
Shetucket Pumping Station	2,554,740	4.3	10,953,000
Spring Creek Pumping Station—Old Plant— Deep wells	2,500,000	6.2	15,500,000
Old plant (shallow wells)	3,580,900	280.0	1,002,680,000
Temporary plant	3,470,000	14.0	48,580,000
Total	88,071,880		1,884,448,000
Column 4 divided by column 2		21.39	
Total deducting Baisley's and Spring Creek	82,227,820		555,896,000
Column 4 divided by column 2		6.76	

Chlorine at Jameco Pumping Station.

The pumping station at Jameco is situated near the head of Cornell Creek, about 2 miles inland from Jamaica Bay and just below Baisley's Pond. At this station there are two separate systems of wells, one composed entirely of deep wells, the other composed of both deep and shallow wells. The deep wells are not affected by sea water. The shallow wells system consisted originally of 183 2-inch wells driven to depths varying from 27 to 73 feet, and averaging about 43 feet. The wells are arranged in three rows, parallel to a main suction, 2 rows being to the east of the suction main and 1 row to the west. (See Diagram No. 10.) The tiers of the rows are about 14 feet apart.

The suction main above mentioned is also connected with four 4-inch wells, three 6-inch wells, four 8-inch wells and one 10-inch well, which vary in depth from 147 to 165 feet, and all of which pierce the clay bed. The water pumped from this system is therefore a mixed one.

At the time when analyses was begun, namely, during the year 1897, it was noticed that the amount of chlorine in the deep and shallow wells was about 20 parts per million, and it was suspected that the difference between this figure and the normal of the region was due to the influence of the sea water upon the shallow wells. Later examinations of individual wells showed that this was the case, and showed further that it was the wells located at the southwest corner of the plant which were most affected by the sea water. The plant is located practically in the bed of the creek, and it appeared from the results that beneath the surface there existed a pocket, or perhaps the bed of an old creek, which passed diagonally across the suction main. This is shown by Diagram No. 10, which gives the area where the wells showed the highest chlorine and iron. The observations upon which this diagram was constructed are given in the following table:

Chlorine and Iron in Jameco Shallow Wells March 31 and April 1, 1898.

	Parts Per Million. Chlorine.	Iron.		Parts Per Million. Chlorine.	Iron.
Well No. 1	8	.40	Well No. 57	456	32.00
Well No. 13	12	.40	Well No. 58	26	3.25
Well No. 14	12	.20	Well No. 60	76	9.40
Well No. 19	12	.40	Well No. 61	160	16.00
Well No. 25	178	14.00	Well No. 62	136	22.00
Well No. 26	14	.70	Well No. 64	282	.40
Well No. 33	144	8.00	Well No. 65	32	8.00
Well No. 39	218	11.00	Well No. 66	400	50.00
Well No. 40	14	.30	Well No. 73	10	.30
Well No. 53	670	36.00	Well No. 76	8	.60
Well No. 54	16	1.75	Well No. 79	8	.30

	Parts Per Million. Chlorine.	Iron.		Parts Per Million. Chlorine.	Iron.
Well No. 83	8	.80	Well No. 119	14	.70
Well No. 86	10	2.75	Well No. 120	12	1.00
Well No. 93	10	1.40	Well No. 143	8	8.00
Well No. 95	18	1.50	Well No. 144	8	1.20
Well No. 97	20	1.00	Well No. 160	12	3.30
Well No. 99	22	1.25	Well No. 166	12	.60
Well No. 107	14	.20	Well No. 178	10	.60
Well No. 108	8	.20			

April 8, 1898.

	Parts Per Million. Chlorine.	Iron.		Parts Per Million. Chlorine.	Iron.
Well No. 13	12	1.20	Well No. 60	84	4.00
Well No. 14	12	.10	Well No. 73	8	1.10
Well No. 26	12	.05	Well No. 79	360	2.00
Well No. 54	74	2.50	Well No. 86	10	1.90
Well No. 56	152	5.00	Well No. 95	20	2.10
Well No. 58	172	8.00	Well No. 99	38	.60

When it was found that the wells enclosed in this area were responsible for the greater part of the chlorine, and it may be added of iron as well, these wells were shut off with temporary benefit to the supply, but it was found that after a time the salt water began to affect the wells in the east row, and as it was feared that ultimately many more of the wells would become salt if this process of shutting down the affected wells was continued, the plan was not carried further, and ultimately, when the need for water in the City became pressing, all of the wells were put into use. At the present time the amount of chlorine in the water furnished by this combined system is about 22 parts per million, about the same as it was five years ago.

Chlorine at Baisley's Driven Well Station.

This station is located at the head of Mud creek, about 1 mile southwest of the Jameco Station and about 1½ miles from Jamaica Bay. The plant consists of 100 two-inch wells, driven on the north side of the conduit and adjacent to it. Their depths vary from 28 to 65 feet and average about 44 feet. The wells are numbered from the east to the west end, the odd numbers being on the north side of the suction main and the even numbers being on the south side. Fifty-two of the wells are located east of the receiver and 48 wells west of it. The surface of the ground at this station has an elevation of about 8 feet. The pumping plant has a capacity of 3,000,000 gallons.

In the fall of 1897 the water at this station was found to contain about 150 parts of chlorine per million, which was obviously caused by the infiltration of sea water from Jamaica Bay. In order to determine whether or not all of the wells were equally affected, certain of the wells were disconnected and individually sampled. The results are shown in the following table:

No.	Chlorine. West End.	No.	Chlorine. East End.
93	12.0	100	12.0
81	12.0	88	13.0
69	13.0	74	13.0
	2.0	64	22.0
41	12.0	48	20.0
23	12.0	34	2,550.0
23	425.0	16	2,950.0
9	1,325.0		

These anaylses indicated that it was the wells of the eastern half of the plant which were affected, and that the wells on the south side of the suction main contained a larger proportion of sea water than the wells on the north side. In order to get rid of the chlorine, the eastern half of the plant was shut off on November 8, 1897, when the chlorine dropped from 149 to 17 parts per million. After pumping for a few days, however, the chlorine began to increase, until November 25, 1897, it reached 50 parts per million. The pumps were then stopped, and the plant remained inoperative until December 1. On that date the whole plant was put into commission. On December 8 the chlorine had reached 61 parts per million, and the pump was again stopped. It was started again on December 29, with the chlorine at 57 parts per million, but it was found on December 30 that the chlorine was 155 parts per million. Pumping was thereupon discontinued, and the plant remained shut down until March 12. It was started on that date with a chlorine of 12 parts per million. This speedily increased until on March 28 it had reached 145 parts per million, when the plant was again shut down.

The following table shows the results of chlorine determinations during these periods:

Chlorine at Baisley's Driven Well Station (Entire Plant).

Date, 1897.	Chlorine.	Remarks.	Date, 1897.	Chlorine.	Remarks.
Nov. 1	145.0		Dec. 29	57.0	Started.
Nov. 3	149.0		Dec. 30	155.0	Stopped.
Nov. 8	17.0	Eastern half shut off.	Mar. 12	12.0	
Nov. 9	18.0		Mar. 13	50.0	
Nov. 10	20.0		Mar. 14	50.0	
Nov. 11	20.0		Mar. 15	80.0	
Nov. 12	22.0		Mar. 16	120.0	
Nov. 13	23.0		Mar. 17	125.0	
Nov. 15	25.0		Mar. 18	140.0	
Nov. 17	26.0		Mar. 19	140.0	
Nov. 19	32.0		Mar. 20	140.0	
Nov. 21	37.0		Mar. 21	150.0	
Nov. 22	40.0		Mar. 22	150.0	
Nov. 25	50.0		Mar. 23	150.0	
Nov. 26	....	Stopped pumping.	Mar. 25	145.0	
Dec. 1	38.0	Started entire plant.	Mar. 27	145.0	
Dec. 8	61.0	Stopped.	Mar. 28	145.0	Shut down.

It will be seen, therefore, that the attempt to get rid of the sea water by occasionally shutting down the plant was only partially successful, and in recent years the demand for water has been so great that this method has not been used.

Brackish Water at Shetucket Pumping Station.

In the fall of 1897 the Shetucket Pumping Station was established at a point about one mile from Jamaica bay, nearly south of the village of Jamaica, on the south side of and adjoining the conduit. The plant consisted of a six-inch suction and twelve eight-inch driven wells. The wells passed through a layer of sand feet deep, thence through a layer of clay feet deep into a stratum of green sand. The wells were staggered along the main suction about 75 feet apart, and were numbered from 1 to 12, beginning at the easterly end. The even numbers were on the seaward side of the suction main. The depths of the individual wells are as follows:

No.	Depth Feet.	No.	Depth Feet.
1	172	7	170
2	180.5	8	177.5
3	167	9	178
4	182	10	176.5
5	181	11	172
6	168	12	175

The average elevation of the surface of the ground was about 6.5 feet above datum line.

The first sample was taken from the wells on October 4 and showed that the water was of good quality. The chlorine was 4.3 parts per million, which was lower than the normal for that region, and which corresponds with the normal chlorine in the middle of Long Island.

For a few months water was pumped at the rate of about 3,700,000 gallons per day, the quality of the water remaining about the same. In March, 1898, the rate of pumping was increased to nearly six million gallons, and following that the amount of chlorine in the water began to increase and led to a reduction in the rate of pumping. From that time on the amount of chlorine in the water has steadily increased, until in 1902 the average chlorine was 433.7 parts per million. This increase of chlorine is shown in Diagram No. 12. The increasing brackishness of the water caused still further reduction in the rate of pumping, until on January 1, 1903, it was below one million gallons per day. The average daily amount of water pumped during each month is also shown on the diagram mentioned. It will be noticed that whenever pumping ceased there was a decrease in the amount of chlorine in the water. Accompanying the increasing chlorine there was an increase in the free ammonia, iron hardness and total solids. There was no increase, however, in the amount of organic matter, as shown by the albuminoid ammonia, neither was there any increase in the nitrates. The nitrites fluctuated between wide limits with no apparent regularity. The iron present in the water produced a noticeable milkiness, and caused the apparent color to increase from 6 to 32.

Table Showing Parts per Million of Chlorine and Solid in Shetucket Wells Water

Date. 1897.	Solid.	Chlorine.	Date. 1898.	Solid.	Chlorine.
October 4	138.5	4.3	January 4	174.0	4.8
November 3	143.0	3.9	January 27	143.0	4.4
November 30	138.0	4.3	February 28	136.0	4.6
			March 24	138.0	4.6
			April 21	141.0	6.3
			May 19	150.0	9.6
			June 16	157.5	11.8
			July 14	189.0	18.0
			August 11	208.5	27.1
			September 8	217.5	38.0
			October 6	227.0	50.0
			November 3	254.0	60.0
			December 5	285.0	74.0

Date. 1899.	Solid.	Chlorine.	Date. 1900.	Solid.	Chlorine.
January 25	318.0	100.0	January 17	750.5	290.0
February 23	390.0	126.0	February 14	703.5	260.0
March 24	460.0	152.0	March 16	694.0	248.0
April 19	402.5	120.0	April 11	502.0	160.0
May 18	511.0	176.0	May 9	780.0	280.0
June 14	557.5	196.0	June 12	810.0	290.0
July 13	560.0	196.0	July 5	788.0	290.0
August 9	629.0	220.0	August 8	828.5	306.0
September 7	657.5	239.0	September 14	873.0	334.0
August 4	678.5	244.0	October 10	709.0	328.0
October 31	677.0	246.0	November 8	870.0	330.0
December 6	569.0	204.0	December 6	840.5	330.0
December 8	604.5	222.0			

Date. 1901.	Solid.	Chlorine.	Date. 1902.	Solid.	Chlorine.
January 16	....	344.0	January 15	1,086.0	464.0
February 7	....	360.0	February 7	....	470.0
February 14	979.0	390.0	February 20	....	458.0
February 26	....	400.0	March 11	....	442.0
March 19	....	328.0	April 9	1,075.0	260.0
April 10	....	318.0	May 17	....	374.0
May 8	849.0	332.0	June 11	....	424.0
June 5	....	388.0	July 9	1,077.0	442.0
July 3	....	380.0	August 6	....	464.0
August 13	1,036.0	398.0	September 12	....	452.0
September 11	....	416.0	October 8	1,144.0	496.0
October 9	....	434.0	November 14	....	460.0
October 15	....	480.0	December 17	....	462.0
October 21	....	472.0			
October 24	....	455.0			
October 31	....	470.0			
November 2	....	470.0			
November 5	1,083.5	460.0			
December 11	....	444.0			

In order to determine whether or not the chlorine came from certain particular wells, or from the wells on the water side of the suction main more than from the wells on the opposite side, series of observations were taken on September 20, 1898; March 9, 1899, and October 24, 1902. On these dates samples were taken from each of the different wells. The results showed no regularity at all. In general the chlorine was higher on the water side than on the land side.

The source of the chlorine is evidently sea water, which reaches the wells not by passing vertically downward through the upper strata of sand, but rather by passing upward from the sea under the clay bed at some point near the sea, where perhaps the clay bed may terminate or be at least broken through.

On October 24, 1902, a two-inch test well was sunk at the station and carried down to a depth of 125 feet, samples being collected at various points as the well was driven down. The amount of chlorine found at different depths was as follows:

Depth, Feet.	Chlorine.	Depth, Feet.	Chlorine.
12	20.0	65	11.0
22	4.0	76	5.4
33	11.8	96	5.8
44	13.4	106	5.4
54	7.2	125	5.4

In order to determine whether or not the amount of chlorine was increased by the tides, a series of samples was collected every two hours from February 28, 1899, at 9 a. m., to March 1, 1899, at 11 p. m.

The results of these analyses were as follows:

Date.	Time.	Chlorine.	Date.	Time.	Chlorine.
Feb. 28.	9 A. M.	126	Mar. 1.	5 A. M.	128
Feb. 28.	11 A. M.	126	Mar. 1.	7 A. M.	128
Feb. 28.	1 P. M.	128	Mar. 1.	9 A. M.	128
Feb. 28.	3 P. M.	128	Mar. 1.	11 A. M.	128
Feb. 28.	5 P. M.	126	Mar. 1.	1 P. M.	126
Feb. 28.	7 P. M.	128	Mar. 1.	3 P. M.	126
Feb. 28.	9 P. M.	126	Mar. 1.	5 P. M.	128
Feb. 28.	11 P. M.	126	Mar. 1.	7 P. M.	128
Mar. 1.	1 A. M.	128	Mar. 1.	9 P. M.	126
Mar. 1.	3 A. M.	128	Mar. 1.	11 P. M.	126

A second series of hourly samples was collected on February 3 and 4, 1903, and the results were as follows:

Date.	Time.	Chlorine, Parts Per Million.	Date.	Time.	Chlorine, Parts Per Million.
Feb. 3.	8 A. M.	88	Feb. 3.	10 P. M.	90
Feb. 3.	9 A. M.	88	Feb. 3.	11 P. M.	90
Feb. 3.	10 A. M.	90	Feb. 3.	12 P. M.	92
Feb. 3.	11 A. M.	90	Feb. 4.	1 A. M.	90
Feb. 3.	12 A. M.	92	Feb. 4.	2 A. M.	90
Feb. 3.	1 P. M.	90	Feb. 4.	3 A. M.	92
Feb. 3.	2 P. M.	90	Feb. 4.	4 A. M.	92
Feb. 3.	3 P. M.	90	Feb. 4.	5 A. M.	92
Feb. 3.	4 P. M.	92	Feb. 4.	6 A. M.	92
Feb. 3.	5 P. M.	92	Feb. 4.	7 A. M.	94
Feb. 3.	6 P. M.	92	Feb. 4.	8 A. M.	92
Feb. 3.	7 P. M.	92	Feb. 4.	9 A. M.	90
Feb. 3.	8 P. M.	92	Feb. 4.	10 A. M.	90
Feb. 3.	9 P. M.	92	Feb. 4.	11 A. M.	90

On February 3 the tide in Jamaica Bay was high at 12 noon. Low water occurred at 7 p. m. On February 4 high water occurred at 1 a. m. and low water at 8 p. m. It will be observed that in both of these cases the fluctuations were extremely small—probably too small to be charged directly to the tidal changes.

On December 17, 1902, the amount of chlorine in the water of Shetucket was 462 parts per million. The plant was shut down on December 9, 1902. On January 9, 1903, at 8 a. m., the plant was started up, and the amount of chlorine was 80 parts per million. Samples were then taken twice a day for six days, with the following results of progressive increase in the amount of chlorine:

Date.	Time.	Parts Per Chlorine, Million.	Date.	Time.	Chlorine, Parts Per Million.
Jan. 9.	8 A. M.	80	Jan. 11.	12 P. M.	266
Jan. 9.	12 M.	98	Jan. 12.	12 M.	344
Jan. 9.	12 P. M.	174	Jan. 12.	12 A. M.	358
Jan. 10.	12 M.	234	Jan. 13.	12 M.	374
Jan. 10.	12 P. M.	276	Jan. 13.	12 P. M.	396
Jan. 11.	12 M.	296	Jan. 14.	12 M.	396

Chlorine at Spring Creek Driven Well Station.

The driven well station at Spring Creek is located at the head of Old Mill Creek, about one mile south of Woodhaven and about two miles from Jamaica bay. There are at this station three systems of driven wells, namely, the deep wells of the old plant, the shallow wells of the old plant and the shallow wells of the new or temporary plant. The deep wells pierce the clay strata and are not salt, and therefore need not be considered. The old shallow wells system consists of 100 two-inch wells driven to depths ranging from 30 to 42 feet, and averaging 36 feet. They were sunk in two rows along the main suction at intervals of 14 feet, the wells of each pair being about 14 feet apart. They are numbered from the centre receiver towards either end, the most easterly wells being called 50 East and the most westerly being called 50 West. The odd numbers are on the north side of the conduit and the even numbers on the south side. In September, 1897, the water pumped from this system was found to be affected by the sea-water to such an extent that it contained nearly 300 parts per million of chlorine. On October 26 and 27 several of the wells were disconnected and individually sampled, with the results given in the following table:

Amount of Chlorine in the Water from Various Wells at Spring Creek Pumping Station, Old Plant, on October 26-27, 1897.

No.	Chlorine.	No.	Chlorine.
47 East	11.0	9 West	11.0
41 East	13.0	13 West	9.0
37 East	14.0	17 West	8.0
35 East	18.0	21 West	10.0
31 East	20.0	27 West	10.0
27 East	21.0	31 West	10.0
50 East	14.0	43 West	9.0
44 East	12.0	47 West	10.0
40 East	13.0	12 West	275.0
34 East	....	20 West	800.0
26 East	124.0	24 West	650.0
24 East	31.0	28 West	450.0
18 East	14.0	30 West	500.0
14 East	67.0	40 West	650.0
12 East	185.0	46 West	850.0
		50 West	1,400.0

It will be seen from this table that it was the southwest quarter of the plant which was affected.

On October 21 the plant was shut down and the wells in this quarter were discontinued. On starting the pumps on October 30 it was found that the chlorine had dropped from 278 to 19 parts per million. In less than 24 hours after starting, however, the chlorine increased rapidly, showing that the water had passed over to the wells on the south side of the suction main. On November 5 the chlorine had reached 240 parts per million and the plant was shut down. It was started again on November 26, with the same result, and this continued until January 8. The plant remained shut down from January 8 to March 12, and when it was started up the chlorine increased much more slowly than before, probably because of the higher elevation of the ground water at that time. This is shown by the following table:

Chlorine in the Water from the Shallow Wells at Spring Creek—Old Plant.

Date.	Chlorine.		Date.	Chlorine.	
1897.			1898.		
Oct. 11	278.0		Mar. 17	35.0	
Oct. 21	....	Shut down.	Mar. 18	60.0	
Oct. 29	....	Started up without southwest quarter.	Mar. 19	70.0	
			Mar. 20	80.0	
Oct. 30	19.0		Mar. 21	85.0	
Oct. 31	168.0		Mar. 22	95.0	
Nov. 1	196.0		Mar. 23	110.0	
Nov. 2	226.0		Mar. 24	125.0	
Nov. 3	230.0		Mar. 25	130.0	
Nov. 4	226.0		Mar. 28	150.0	
Nov. 5	240.0	Shut down.	Mar. 30	165.0	
Nov. 26	18.0	Started.	April 1	170.0	
Nov. 27	75.0		April 5	170.0	
Dec. 1	178.0	Shut down.	April 11	175.0	
1898.			April 15	170.0	
Jan. 2	10.0		April 21	170.0	
Jan. 4	62.0		April 25	175.0	
Jan. 5	82.0		April 27	165.0	Shut down.
Jan. 8	136.0	Shut down.	Aug. 12	125.0	
Mar. 12	20.0	Started.	Sept. 8	482.0	Whole plant started.
Mar. 13	20.0		Sept. 9	240.0	
Mar. 14	20.0		Oct. 6	210.0	
Mar. 15	30.0		Nov. 3	166.0	

Chlorine in Individual Shallow Wells of the Spring Creek Pumping Station—Old Plant.

September 9, 1898.

No.	Chlorine.	No.	Chlorine.
47	17.0	50 East	15.0
		46 East	15.0
		40 East	12.0
		32 East	12.0
		30 West	300.0
		40 West	450.0
		46 West	375.0
		50 West	320.0

On September 9, 1898, a second series of observations was made to determine the distribution of the chlorine. It was found, as before, that the salt came from the southwest quarter of the plant, but the figures were not as high as those obtained on October 26, 1897. The fluctuations in the chlorine from 1897 to 1902 are shown in Diagram No. 13.

The new or temporary plant at Spring Creek consists of 13 six-inch wells 30 feet long, staggered on each side of the main suction at about 35 feet from it, the wells being driven to depths ranging from 42 to 75 feet. The water from these wells is but slightly affected by the sea-water. The chlorine seldom rises above 50 parts per million. Attempts were made to reduce this chlorine, however, in the fall of 1897, with results shown in the following table:

Chlorine in Water from Shallow Wells, Spring Creek Pumping Station—Temporary Plant.

Date.	Chlorine.		Date.	Chlorine.	
1897.			1898.		
Oct. 22	13.2		Mar. 25	25.0	
Nov. 30	42.0		Mar. 30	40.0	
Dec. 6	56.0		April 1	50.0	
Dec. 7	58.0	Shut down.	April 11	45.0	
Dec. 30	21.0	Started.	April 17	45.0	
1898.			April 19	60.0	
Jan. 4	62.0		April 21	50.0	
Jan. 5	59.0		April 25	50.0	
Jan. 8	37.0		April 28	50.0	Shut down.
Jan. 25	....	Shut down.	May 2	....	Started.
Mar. 12	16.0		May 3	35.0	
Mar. 13	30.0		May 5	50.0	
Mar. 14	20.0		May 13	....	Shut down.
Mar. 19	25.0		May 14	50.0	Started.

The influence of sea-water upon this station was well shown by observations made on October 9 and 10, 1897. Samples were collected from the pump every hour, with the results shown on Diagram No. 14. The times of high and low water in Jamaica bay are also shown on the diagram. It will be seen from these calculations that the rise and fall of the tide caused fluctuations in the amount of chlorine in the water pumped. There was apparently a lag of several hours between the time of high tide and the time of highest chlorine in the water. The hourly increase in chlorine after the pump had been shut down for some time is shown in Diagram No. 15.

Hardness—Ridgewood System.

The hardness of the various waters of the Ridgewood system is shown by the following table giving the average hardness of these different sources for a period of five years:

Hardness of the Various Water Supplies Comprising the Ridgewood System.*

Surface Waters.	Alkalinity.	Permanent Hardness.	Total Hardness.
Old Watershed—			
Massapequa pond	5.8	4.7	10.5
Wantagh pond	4.6	8.5	13.1
Newbridge pond	4.4	7.8	12.2
East Meadow	4.1	10.6	14.7
Millburn Reservoir	5.3	12.4	17.7
New Watershed—			
Hempstead Storage Reservoir	8.0	12.4	20.4
Schodack brook	5.6	12.4	18.0
Hempstead pond	6.3	11.0	17.3
Pines pond	7.3	13.8	21.1
Smith pond	6.2	11.0	17.2
Valley Stream pond	7.5	17.9	25.4
Watt's pond	7.8	16.6	24.4
Clear Stream pond	8.7	20.6	29.3
Simonson's pond	8.5	23.2	31.7
Springfield pond	15.0	20.9	35.9
Baiseley pond	28.6	21.8	50.4

*Based on monthly and in some cases weekly analyses from 1898 to 1902, inclusive.

Hardness of the Various Water Supplies Comprising the Ridgewood System.*

Ground Waters.	Alkalinity.	Permanent Hardness.	Total Hardness.
Old Watershed—			
Massapequa (deep and shallow)	11.4	9.4	20.8
Wantagh (deep and shallow)	1.7	5.0	6.7
Matowa (deep and shallow	2.1	7.2	9.3
Merrick (deep and shallow)	5.0	11.4	16.4
Agawam (deep and shallow)	1.4	7.0	8.4
Millburn pumping (mixed surface and ground waters)	5.4	9.1	14.5
New Watershed—			
Watt's pond (shallow)	8.3	19.9	28.2
Clear stream (shallow)	7.1	21.0	28.1
Forest stream	9.5	14.9	24.4
Springfield (deep)	4.0	11.7	15.7
Jameco (deep)	84.8	3.6	88.2
Jameco (deep and shallow)	48.4	25.4	73.8
Baiseley's (shallow)	26.4	84.6	111.0
Oconee (deep)	101.1	4.9	106.0
Shetucket (deep)	80.3	159.4	240.0
Spring creek, old plant (deep)	115.0	8.6	123.6

Ground Waters.	Alkalinity.	Permanent Hardness.	Total Hardness.
Spring creek, old plant (shallow)	89.7	71.4	161.1
Spring creek, new plant (shallow)	100.0	66.2	166.2
Ridgewood, North Side Pumping Station (mixed surface and ground water)	17.8	20.3	38.1
Ridgewood South Side Pumping Station (mixed surface and ground water)	15.6	17.6	33.2
Average water entering Ridgewood Reservoir	16.7	19.0	35.7

*Based on monthly and in some cases weekly analyses from 1898 to 1902, inclusive.

There are no limestone deposits which outcrop on Long Island, and the surface waters are comparatively soft. They increase in hardness, however, from east to west, this being due apparently to the effect of increasing density of population. The permanent hardness due to the sulphates, nitrates, etc., is generally higher in these waters than in the surface waters of the Croton watershed, this being due in part, no doubt, to the proximity of these watersheds to the seacoast. Just as the chlorine is higher near the coast on account of the salt, blown in as a fine spray from the ocean, so also are some of the other mineral constituents increased.

The ground waters naturally show the greatest variations in hardness. The wells on the "new" watershed are extremely soft and are especially low in alkalinity.

The hardness of the Ridgewood water since 1898 is shown by months in the following table:

The maximum and minimum and average hardness of the water entering Ridgewood reservoir for the past five years has been as follows:

	1898.	1899.	1900.	1901.	1902.
Maximum	56.5	43.6	49.0	52.3	43.5
Minimum	14.9	22.3	27.3	24.0	22.8
Average	33.8	34.7	37.0	38.0	38.0

It will be seen from this that there is no regular seasonal change in hardness of the City water, the fluctuations being caused rather by different combinations of the various sources of supply. During the past five years the average annual hardness has gradually increased.

Mean Monthly Hardness of the Water Entering Ridgewood Reservoir.

	1898.	1899.	1900.	1901.	1902.
January	34.4	35.4	30.5	34.6	41.2
February	29.1	39.3	37.4	37.7	41.4
March	37.0	32.9	38.2	37.8	42.7
April	38.4	33.7	35.3	35.8	38.9
May	33.0	39.7	37.3	33.9	34.0
June	26.6	34.8	39.5	37.1	37.2
July	26.9	32.7	34.1	37.8	38.4
August	29.9	34.4	36.3	39.7	38.4
September	37.0	34.8	35.2	40.0	36.0
October	40.5	32.2	36.0	36.6	37.8
November	39.5	32.6	45.4	41.1	37.7
December	33.3	34.0	39.3	44.3	32.7
Average	33.8	34.7	37.0	38.0	38.0

The shallow wells on the old watershed which are not affected by sea water—namely, Watts Pond well, Clear Stream wells and Forest Stream wells—are likewise comparatively soft, although harder than the eastern wells. The shallow wells which are affected by the sea water as indicated by their high chlorine—namely, Jameco (deep sea and shallow), Baisley's and Spring Creek—have high hardness, with especially high sulphates, nitrates, etc. The deep wells vary considerably. At Springfield the water is very soft, while at Jameco, Shetucket and Spring Creek there are high alkalinities but low sulphates. At Shetucket, on the other hand, the hardness is very high, and is due chiefly to sulphates, nitrates, etc. These wells, however, are very much affected by sea water.

The waters from these various sources unite to give an average hardness at Ridgewood of 35.7 parts per million, of which 16.7 is due to carbonates and bicarbonates and 19.0 to sulphates, nitrates, etc. These figures often vary with great suddenness, as one or another of the different sources of supply are turned on or shut off. The effect upon the system of the use of such water as that from the Shetucket wells, for example, is very obvious.

The high chlorine, relatively high sulphates and high nitrates unite to make the water from the Ridgewood system a poor water for use in steam boilers. A comparison between this water and that of the Croton supply, which is quite satisfactory for boilers, is instructive.

A few years ago, before the use of those driven wells which are affected by sea water, the Brooklyn supply was considered an excellent one for boiler purposes—equal, if not superior, to the Croton water. The following analysis, made by the late Dr. Albert R. Leeds, Stevens Institute, in 1881, shows the hardness and chlorine to be much lower than they are at the present time, or than they are likely to be again (the population on the watershed having very greatly increased during the past twenty years).

Sample—From No. 321 Gates Avenue, Brooklyn, New York. Date of collection, June 23, 1881:

	Parts Per Million.		Parts Per Million.
Color	None	Oxygen consumed	4.13
Taste	None	Total solids	60.0
Smell	.0075	Organic and volatile	10.0
Free ammonia	.0826	Mineral matter	50.0
Nitrites	.0000	Hardness	22.7
Nitrates	1.2025	Chlorine	5.5

Nor has the quality of the water yet become serious enough to cause general complaint. Nevertheless, the presence of 25 parts per million of chlorine in the feed water of a boiler cannot be without its effect.

	Parts per Million. Croton Water. 135th St. Gate House. Aver. 9 mos.	Millburn Pumping Station. Aver. 5 Yrs.	Ridgewood Water. Aver. 5 Yrs.
Total solids	71.5	41.7	92.6
Chlorine	2.0	5.7	17.6
Alkalinity	32.7	5.4	16.7
Permanent hardness (sulphates, nitrates, etc.)	4.7	9.1	18.9
Total hardness	37.4*	14.5	35.6
Ntirates	0.14	0.91	1.07
Iron	0.28	0.25	0.52

* The average of 15 years was 38.9.

It will be seen that the total hardness is not greatly different in the two waters, but the hardness of the Croton water is due chiefly to carbonates, and tends to form a soft scale in boilers, while the hardness in the Ridgewood water is due largely to sulphates, etc., which tend to form a hard scale. The Ridgewood water is not a scale-forming water, however, so much as it is a corrosive water. This is due to the chlorides, especially to the chloride of magnesium, derived from the brackish wells. The amount of dissolved free carbonic acid, another corrosive constituent, is also greater in the Ridgewood water than in the Croton water, this also being derived from the driven wells. A practical example of the effects of the Brooklyn water upon boilers may be observed at the Ridgewood Pumping Station, where some of the boilers are very badly pitted. In contrast to these are the boilers at the Millburn Pumping Station, which are in excellent condition, and which are fed from the water derived from the eastern ponds. The average constituents of this water are also given in the above table.

The elimination from the Ridgewood supply of the driven wells which are affected by the sea water is a measure which should be undertaken as soon as the amount of water thus lost can be made up from other sources. This is a practical proposition in which every boiler owner in the City should be interested.

Iron—Some of the driven wells of the Ridgewood system contain large amounts of iron. This is shown by the following table of average figures:

Table Showing the Amount of Iron in the Different Sources of Supply.

Surface Water.	Parts Per Million.	Ground Water.	Parts Per Million.
Massapequa pond	.08	Massapequa (deep and shallow)	.45
Wantagh pond	.21	Wantagh (deep)	.52
Newbridge pond	.18	Matawa (deep)	.45
East Meadow pond	.51	Merrick (deep)	.67
Millburn pond	.18	Agawam (deep)	.27
Hempstead storage reservoir	.27	Watt's pond (shallow)	.64
Schodack brook	.24	Clear Stream pond (shallow)	.30
Hempstead pond	.33	Forest Stream pond (shallow)	1.18
Pine's pond	.40	Springfield pond (deep)	3.53
Smith's pond	.55	Jameco (deep)	.63
Valley Stream pond	.34	Jameco (deep and shallow)	3.37
Watt's pond	.41	Baiseley's (shallow)	.20
Clear Stream pond	.14	Oconee (deep)	.57
Simonson's pond	.26	Shetucket (deep)	2.02
Springfield pond	.81	Spring creek, old plant (deep)	.70
Baiseley's pond	1.26	Spring creek, old plant (shallow)	.06
		Spring creek, new plant (shallow)	.13

	Parts Per Million.		Parts Per Million.
Ridgewood, Basin No. 2 influx	.58	Mt. Prospect Reservoir	.22
Ridgewood, Basin No. 3 influx	.45	Tap in Mt. Prospect Laboratory	.41
Ridgewood, Basin No. 1 efflux	.38	Tap, Flushing and Clermont avenues	.37
Ridgewood, Basin No. 2 efflux	.37	Tap, Flatbush and Seventh avenues	.37
Ridgewood, Basin No. 3 efflux	.33		

The iron is highest in the wells at Forest Stream, Springfield, Jameco and Shetucket. In general the deep well water, that is, water below the clay strata, contains the largest amount. The iron precipitates on standing and the figures show that a considerable reduction occurs in the distribution reservoirs and pipes. As delivered to the consumers the amount of iron in the water is comparatively small.

Independent Water Supplies, Borough of Brooklyn.

In every case, save one, the waters supplied by the independent driven well stations in the Borough are entirely satisfactory from the physical and sanitary standpoint. They are cold, clear, practically colorless and odorless, contain little or no organic matter, very little iron, few bacteria, no offensive microscopic organisms, and invariably give negative tests for B. coli.

The exception referred to is that of the New Lots supply (formerly the Long Island Water Supply Company), which supplies water to East New York. This supply has an open reservoir connected with its system, which frequently becomes foul from growths of microscopic organisms, such as synedra and chlamydomonas. These organisms are sometimes found in numbers as high as 25,000 per c. c. At such times consumers who happen to receive the back flow from the reservoir complain seriously of the quality of the water, and certainly with good reason. It is an exaggerated case of the evil effects of storing ground waters in an open reservoir. This reservoir is small, and if its use is to be continued it should be roofed over.

The chlorine, moreover, is generally somewhat high in these independent supplies, as shown by the following table of average results for five years:

Supply.	Chlorine. Parts Per Million.
New Lots	21.4
German-American	27.1
Gravesend	13.1
New Utrecht	64.1
Flatbush	13.1
Pfalzgraf	15.3
Blythebourne	8.1
Prospect Park	7.0

The most serious case is that of the New Utrecht supply.

This station is located about one mile east of Gravesend and about one and a quarter miles north of Sheepshead Bay. It is near East Fourteenth street and between Avenues U and V. It is about 3,000 feet southwest from the Gravesend Pumping Stations.

Ordinarily the chlorine in the water has not exceeded 25 parts per million, but during the spring of 1900, when the drought on the plant was increased, the effect of the infiltering sea water began to be noticed. The chlorine increased in a somewhat irregular manner until in the summer of 1901 it reached 165 parts per million. After that it somewhat rapidly decreased. During the summer of 1902 there was a decrease of 70 parts per million. These fluctuations are shown on Diagram No. 16.

The water furnished by the independent companies, because of their hardness and high chlorine, are poor for boiler-waters.

They are very hard, as shown by the following table of average results, based on monthly or quarterly observations covering a period of four, and, in some cases, five years:

	Hardness in Parts per Million. Alkalinity.	Permanent Hardness.	Total Hardness.
New Lots, driven wells	102.6	65.2	167.8
German-American Water Supply Company	103.0	71.0	174.0
Gravesend, driven wells	57.4	35.8	93.2
New Utrecht	61.8	66.9	128.7
Flatbush Water Company	60.0	45.4	105.4
Pfalzgraf Water Company	101.5	61.9	162.4
Blythebourne Water Supply Company	63.6	29.5	93.1
Prospect Park	142.0	40.0	182.5

It will be seen that the water from New Lots (formerly the Long Island Water Supply Company), the German-American, the Pfalzgraf and Prospect Park driven well stations. is exceedingly hard, and the hardness includes not only carbonates, but sulphates and nitrates in large quantities. The next hardest water is that from the New Utrecht driven wells, which are somewhat offset at times by sea water. The Flatbush water stands next in hardness, and last are the Gravesend and Blythebourne wells, which are only slightly softer than the Flatbush water, but which have lower permanent hardness.

The hardness of all these driven well waters has shown an increase during the past five years, as indicated by the following figures:

	Hardness—Parts per Million. 1898.	1899.	1900.	1901.	1902.
New Lots	124.1	149.8	191.4	181.7	191.9
German-American	165.9	172.3	156.1	189.5	186.3
Gravesend	91.1	91.6	100.8	88.3	94.2
New Utrecht	90.1	87.5	135.9*	185.6*	144.2
Flatbush	95.7	99.6	109.9	109.9	112.0
Pfalzgraf	72.9	167.8	183.0	196.4	192.0
Blythebourne	75.7	80.1	91.2	92.1	126.3

*Affected by sea-water during these years.

The water furnished by the independent plants has one desirable quality which that of the Ridgewood system does not have, namely, a more equable temperature. As the water is taken from the ground at a considerable depth and pumped directly into the distribution pipes it retains with but slight difference its initial temperature, so that during the summer the citizens are furnished with water cool enough for drinking without adding ice (i. e., about 55 degrees F.), while in the winter it is about 15 degrees above the freezing point. The temperature of the Ridgewood water, on the other hand, is only a few degrees above the freezing point during the winter, and in summer often rises to above 70 degrees, making it unpalatable and emphasizing any objectionable odor that the water may happen to have.

The following table gives the results of some of the temperature observations which have been made:

Quality of the Water Supply of the Borough of Queens.

The Borough of Queens depends almost entirely upon ground water for its sources of supply. The only exception is the station at Bayside, where a small amount of water is occasionally drawn from Oakland lake. Some of the supplies are owned and operated by the City, while others are owned by private companies.

All of the waters supplied to the Borough of Queens are generally satisfactory as to their physical qualities. They are generally clear, very low in color and without odor. They are also generally satisfactory from the sanitary standpoint. The water of Oakland lake, part of the Bayside supply, is turbid at times and has a disagreeable odor, but this water is seldom used. The water at the Flushing Station also has at times a slight turbidity.

There are only two water supplies in the borough where there is any practical danger of pollution. These are the Flushing Station (formerly called the College Point Station) and the Bayside Station (formerly called the Flushing Station). The former supply consists of an open basin, which is fed almost entirely by ground water. A small stream passes along the side of this basin and is separated from it by an earthen embankment. This stream is more or less polluted. There are a dozen houses within a distance of about a mile from the basin, and the hills along the stream are steep and richly cultivated. Under ordinary conditions. the water in the brook is lower than that in the basin, but after heavy rains it becomes higher, and is in danger of entering the basin should there be any leak in the gate which connects it with the basin. The brook water should under no condition be used. On one occasion it was found that the gate had been left open by accident, and analyses indicated that the water pumped was temporarily in a bad condition.

Oakland lake forms a part of the supply pumped at the Flushing Station. It is not ordinarily drawn upon, however. It has a small watershed, upon which there is comparatively little pollution, although there are a few houses and some farm land upon it. The physical character of the lake is unsatisfactory, however, and the supply is ordinarily unfit for use on account of the abundance of microscopic growths.

With one or two exceptions the water supplies of the Borough of Queens are hard. This is shown by the following table of average results, based on quarterly analyses extending in most cases over five years.

	Alkalinity.	Permanent Hardness.	Total Hardness.
Long Island City, Station No. 1	91.5	90.4	181.9
Long Island City, Station No. 2*	145.2	273.0	418.2
Long Island City, Station No. 3	134.9	64.9	199.8
Citizens' Water Company, Station No. 1	142.0	64.1	206.1
Citizens' Water Company, Station No. 2	109.9	67.7	177.6
Citizens' Water Company, Station No. 3	92.7	14.8	107.5
Citizens' Water Company, Station No. 4	97.3	33.1	130.4
Citizens' Water Company, Station No. 5	95.8	28.5	124.3
Whitestone Pumping Station	107.3	32.7	140.0
Flushing Water Works	31.5	20.4	51.9
Bayside Water Works	35.3	13.9	49.2
Woodhaven Water Company	109.4	18.9	128.3
Montauk Water Company	75.8	32.1	107.9
Jamaica Water Supply Company	38.7	43.1	81.5
Queens County Water Supply Company (filtered)	9.3	4.9	14.2

* Destroyed in 1902 by boiler explosion.

The water at Station No. 2, used until last year, was excessively hard on account of infiltration of sea water and was totally unsuited for purposes of a public supply.

Station No. 2, Long Island City.

This station was located about half a mile southeast of Steinway and less than half a mile from the East river. It is separated only by a high embankment from a large swamp area, covered at times by the sea. This plant consisted of wells, driven to an average depth of feet. In 1898 the water pumped from this station contained more than 800 parts of chloride per million. It was decidedly brackish. Samples have been collected from this station only once a quarter. During 1899 and a part of 1900 less water was pumped from this station, and the pump was not operated during the night. This caused the chloride to drop to less than 10 parts per million During 1901 and 1902 the chloride continued to increase until it reached 900 parts per million. During the first part of 1902 it decreased slightly, until, on November 1902, the station came to an end through the explosion of one of the boilers, which was indirectly due to corrosion, caused by the muriatic character of the water. The above mentioned changes in chlorine are shown on Diagram No. 17.

Of the existing plants the chlorine is excessively high only in Station No. 1, Long Island City, and in the proposed supply from North Beach. In several of the stations. however, the chlorine is more than 10 parts per million.

The water of the Queens County Water Supply Company, which supplies the Far Rockaway section, contains a large amount of iron when it comes from the ground. It is passed through a sand filter, however, before it enters the distribution system, and all of the iron is removed. The water is cool, clear, colorless, soft, and furnishes a well-nigh perfect supply. It contains quite a large amount of dissolved carbonic acid, however, and this is said to be the occasional cause of trouble in some of the iron service pipes.

Quality of the Water Supplies of the Borough of Richmond.

All of the water supply to the Borough is taken from the ground by means of driven wells. There are five stations, only one of which, namely, that at Tottenville, is operated by the City.

These waters are all safe from the sanitary standpoint.

The wells of New Springfield, Clove Station and New Dorp yield excellent water, save that it is very hard.

The water from the Tottenville plant is not only hard, but contains a large amount of iron in such a condition that it precipitates easily. When the water leaves the ground it is clear, but by the time the samples reach the laboratory they have become turbid and colored because of the precipitation of the oxide of iron.

The water furnished by the West New Brighton Station of the Staten Island Water Supply Company is very unsatisfactory. Not only is it very hard, but it contains a large amount of chloride and iron. It is totally unfit for use in boilers, and is objectionable for domestic use. From the sanitary standpoint, however, there seems to be no reason to doubt its safety.

The relative hardnesses of the different water supplies in the Borough of Richmond are shown by the following figures:

	Alkalinity.	Permanent Hardness.	Total Hardness.
Staten Island Water Supply Company—			
West New Brighton Station	76.0	101.5	177.5
New Springfield Station	77.6	67.0	144.6
Crystal Water Supply Company—			
Clove Station	97.4	41.1	138.5
New Dorp Station	143.4	35.6	179.0
Tottenville Water Supply Company	134.6	33.4	168.0

Department of Water Supply, Gas and Electricity,
Office of Chief Engineer, Nos. 13-21 Park Row,
City of New York, December 8, 1903.

NICHOLAS S. HILL, Jr., Esq., Chief Engineer, Department of Water Supply, Gas and Electricity, Park Row Building, New York City:

Dear Sir—I send you accompanying a statement of the work done under my charge (laying water mains and repairs thereto), for the quarter and also for the year ending December 31, 1903.

Respectfully,
CHARLES H. BULL, Assistant Engineer.

Laying Water Mains—Report for Quarter Ending December 31, 1903.

Contracts for laying water mains in the following streets and avenues have been completed during the quarter:

One Hundred and Sixty-third street, between Morris and Sherman avenues.

From stand-pipe at the new high-service pumping station, at Jerome Park Reservoir to Jerome avenue.

Jerome avenue, between Kingsbridge road and Two Hundred and Thirty-third street.

Two Hundred and Thirty-third street, between Jerome and Webster avenues.

Mosholu avenue, between Jerome and Riverdale avenues.

Kingsbridge road, between Jerome and Sedgwick avenues.

Bainbridge avenue, between One Hundred and Ninety-sixth street and Kingsbridge road.

Beach avenue, between One Hundred and Forty-ninth street and Crane street.

Boscobel avenue, between One Hundred and Sixty-ninth and One Hundred and Seventieth streets.

Clinton avenue, between Tremont avenue and Crotona Park North.

College avenue, between One Hundred and Sixty-third and One Hundred and Sixty-fourth streets.

Dailey avenue, between One Hundred and Seventy-seventh and One Hundred and Eightieth streets.

Franklin avenue, between One Hundred and Sixty-fifth and One Hundred and Sixty-seventh streets.

Hughes avenue, between Tremont and Pelham avenues.

Inwood avenue, between One Hundred and Sixty-ninth street and Featherbed lane.

Jackson avenue, between One Hundred and Sixty-sixth street and Boston road.
Jerome avenue, between Buchanan place and Fordham road.
Marion avenue, between One Hundred and Ninety-eighth street and Southern Boulevard.
Morris avenue, between Tremont and Burnside avenues.
Walton avenue, between Tremont and Burnside avenues.
Washington avenue, between One Hundred and Seventy-seventh street and Brook avenue.
River avenue, between One Hundred and Forty-ninth and One Hundred and Fiftieth streets.
One Hundred and Fortieth street, between Locust and Walnut avenues.
One Hundred and Forty-fourtht street, between Robbins avenue and Southern Boulevard.
One Hundred and Fiftieth street, between River and Cromwell avenues.
One Hundred and Fiftieth street, between Mott avenue and Spencer place.
One Hundred and Sixty-fourth street, between Prospect and Stebbins avenues.
One Hundred and Sixty-seventh street, between Anderson and Woodycrest avenues.
One Hundred and Seventy-first street, between Park and Fulton avenues.
One Hundred and Eighty-second street, between Park and Washington avenues.
One Hundred and Eighty-third street, between Belmont avenue and Southern Boulevard.
One Hundred and Eighty-seventh street, between Third avenue and Southern Boulevard.
Two Hundred and Sixtieth street, between Riverdale and Liebig avenues.
Clinton place, between Jerome avenue and Aqueduct Avenue East.
Lorillard place, between Third avenue and One Hundred and Eighty-eighth street.
Mount Hope place, between Jerome and Morris avenues.
Lorillard place, between One Hundred and Eighty-ninth street and Pelham avenue.
Wilkins place, between Southern Boulevard and Boston road.
Kingsbridge road, between Bailey and Nathalie avenues.
Bronx and Pelham parkway, between Southern and Eastern Boulevards.

Linear Feet of Pipe Laid.

36-inch	154
20-inch	5,407
12-inch	10,741
6-inch	12,302
Total	28,604

Pipe relaid on account of grading of streets and avenues in

Borough of The Bronx, linear feet	6,554
Plus linear feet laid as above	28,604
Total	35,158

Stop-cocks Set.

20-inch	1
12-inch	29
6-inch	37
Total	67

Hydrants Placed.

Double-nozzle New York	43
Single-nozzle New York	35
Total	78

Amount of Pipe Laid, Stop-cocks Set and Hydrants Placed During 1903.

SUMMARY, 1903.

Pipe.

Diameter of Pipe.	Linear Feet Laid to December 31, 1902.	Linear Feet Laid from December 31, 1902, to December 31, 1903.	Total Linear Feet Laid to December 31, 1903.
48-inch	174,150	47	174,197
36-inch	254,068	6,040	260,108
30-inch	43,528	.....	43,528
24-inch	11,542	.....	11,542
20-inch	259,434	36,661	296,095
16-inch	19,494	.....	19,491
12-inch	1,097,116	54,542	1,151,158 *a*
10-inch	6,629	.....	6,629
6 inch	2,811,108	29,169	2,819,782 *b*
4-inch	58,966	175	59,141
Totals	4,736,035	126,634	4,841,674
Miles	896.98	23.93	916.98 *c*

a. Less 500 linear feet 12-inch pipe abandoned.
b. Less 20,495 linear feet 6-inch pipe abandoned.
c. Less 20,995 linear feet (3.98) miles of pipe replaced in 1903.

Stop-cocks.

Diameter of Stop-cock.	Set to December 31, 1902.	Set from December 31, 1902, to December 31, 1903.	Total Set to December 31 1903.
48-inch	43	1	44
6-inch	76	3	79
30-inch	32	.....	32
4-inch	13	.....	13
20-inch	260	10	270
16-inch	23	.....	23
12-inch	2,173	173	2,345 *a*
10-inch	17	.....	17
7-inch	1	.....	1
6-inch	6,843	134	6,930 *b*
4-inch	156	31	187
Totals	9,637	352	9,941

a. Less 1 12-inch stop-cock abandoned.
b. Less 47 6-inch stop-cocks abandoned.

Hydrants.

Pattern of Hydrant.	Placed to December 31, 1902.	Placed from December 31, 1902, to December 31, 1903.	Total Placed to December 31, 1903.
Nos. 1, 2 and 3	3,497	8	3,438 *a*
Victor	132	.....	131 *b*
"A"	4,472	.....	4,437 *c*
"B"	1,730	.....	1,717 *d*
Double-nozzle "A"	522	2	517 *e*
" "New York"	1,972	260	2,227 *f*
Single-nozzle "New York"	41	74	115
Miscellaneous	32	7	39
Totals	12,398	351	12,621

a. Less 67 Nos. 1, 2 and 3 hydrants replaced by new.
b. Less 1 Victor hydrant replaced by new.
c. Less 35 "A" hydrants replaced by new.
d. Less 13 "B" hydrants replaced by new.
e. Less 7 Double-nozzle "A" hydrants replaced by new.
f. Less 5 Double-nozzle "New York" hydrants replaced by new.

In addition to the above the following amount of work has been done in relaying mains on account of regrading of streets and avenues in the Borough of The Bronx:

6-inch pipe, linear feet	6,554

Streets and Avenues in Which Water Mains Have Been Laid During Year 1903.

(R) indicates mains relaid and replacing others.

48-Inch Pipe.

From the stand-pipes at the new High Service Pumping Station at Jerome Park Reservoir, to Jerome avenue.

36-Inch Pipe.

Jerome avenue, between Two Hundred and Eighth and Two Hundred and Thirty-third streets.

20-Inch Pipe.

Kingsbridge road, between Jerome and Sedgwick avenues.
Mosholu avenue, between Jerome and Riverdale avenues.
(R) One Hundred and tenth street, between Madison and Fifth avenues.
Pelham avenue, between Southern Boulevard and Eastern Boulevard.
Pelham avenue, between Third avenue and Southern Boulevard.
Sedgwick avenue, between One Hundred and Sixty-seventh street and Washington Bridge.

12-Inch Pipe.

(R) Twenty-eighth street, between Eleventh and Thirteenth avenues.
Seventh avenue, between One Hundred and Forty-ninth and One Hundred and Fifty-third streets.
Bear Swamp road, between Morris Park avenue and West Farms road.
West Farms road, between Bear Swamp road and Silver lane.
Silver lane, between West Farms road and Main street.
Boulevard Lafayette, between One Hundred and Eighty-first street and a point 1,000 feet north.
One Hundred and Thirty-eighth street, between Park and Rider avenues.
Lexington avenue, between One Hundred and Eighteenth and One Hundred and Twenty-fifth streets.
One Hundred and Thirty-fifth street, between Gerard and Park avenues.
Gerard avenue, between One Hundred and Thirty-fifth and One Hundred and Thirty-eighth streets.
One Hundred and Sixteenth street, between Broadway and Riverside Drive.
Riverside avenue, between One Hundred and Twenty-fifth and One Hundred and Twenty-seventh streets.
One Hundred and Twenty-second street, between Broadway and Amsterdam avenue.
Jerome avenue, between Buchanan place and Fordham road.
(R) Kingsbridge road, between Bailey and Nathalie avenues.
Hughes avenue, between One Hundred and Seventy-seventh street and avenue.
Fifty-eighth street, between Sixth and Seventh avenues.
Fifty-ninth street, between Fifth and Eighth avenues.
Twentieth street, between Broadway and Seventh avenue.
Cannon street, between Grand and East Third street.
Nineteenth street, between Broadway and Seventh avenue.
Roosevelt street, between Park row and South street.
Reade street, between Broadway and Centre street.
Duane street, between Broadway and Park row.
Thirty-third street, between Fifth and Seventh avenues.

Thirty-fifth street, between Fifth and Seventh avenues.

6-Inch Pipe.

(R) Twenty-fourth street, between Eleventh and Thirteenth avenues.
(R) Briggs avenue, between One Hundred and Ninety-ninth street and Southern Boulevard.
One Hundred and Thirty-seventh street, between Brook and St. Ann's avenues.
One Hundred and Thirty-sixth street, between Brook and St. Ann's avenues.
(R) West Farms road, between Home and Jennings streets.
One Hundred and Twenty-fourth street, between Columbus and Manhattan avenues.
Manhattan street, between Columbus and Manhattan avenues.
Victor street, between Morris Park avenue and Unionport road.
One Hundred and Eightieth street, between Amsterdam avenue and Broadway.
Jackson avenue, between One Hundred and Sixty-sixth street and Boston road.
Wilkins place, between Southern Boulevard and Boston road.
Convent avenue, between One Hundred and Thirty-first and One Hundred and Thirty-fifth streets.
Lexington avenue, between One Hundred and Eighteenth and One Hundred and Twenty-fifth streets.
One Hundred and Thirty-ninth street, between Convent avenue and a point 425 feet west of Broadway.
One Hundred and Forty-fourth street, between Southern Boulevard and Robbins avenue.
One Hundred and Forty-ninth street, between Eighth and Bradhurst avenues.
One Hundred and Thirtieth street, between Convent and St. Nicholas avenues.
Beach avenue, between Crane and One Hundred and Forty-ninth streets.
Convent avenue, between One Hundred and Fiftieth and One Hundred and Fifty-second streets.
One Hundred and Thirty-fifth street, between Park avenue and Mott Haven canal.
Belmont avenue, between One Hundred and Eighty-third street and a point 250 feet north.
One Hundred and Twelfth street, between Broadway and Riverside Drive.
One Hundred and Fiftieth street, between River and Cromwell avenues.
River avenue, between One Hundred and Forty-ninth and One Hundred and Fiftieth streets.
College avenue, between One Hundred and Sixty-third and One Hundred and Sixty-fourth streets.

Claremont avenue, between One Hundred and Sixteenth and One Hundred and nineteenth streets.
Franklin avenue, between One Hundred and Sixty-fifth and One Hundred and Sixty-seventh streets.
One Hundred and Twenty-seventh street, between Riverside and Claremont avenues.
One Hundred and Fortieth street, between Fifth and Lenox avenues.
(R) Twenty-ninth street, between Eleventh and Thirteenth avenues.
Twenty-first avenue, between White Plains road and Catharine street.
Morris avenue, between Burnside avenue and One Hundred and Seventy-ninth street.
Walton avenue, between Burnside avenue and One Hundred and Seventy-ninth street.
Two Hundred and Sixtieth street, between Riverdale and Liebig avenues.
One Hundred and Eighty-second street, between Park and Washington avenues.
Undercliff avenue, between Sedgwick avenue and One Hundred and Seventy-sixth street.
Undercliff place, between Undercliff and Aqueduct avenues.
East Fourth street, between Lewis street and East river.
Marion avenue, between One Hundred and Ninety-eighth street and Southern Boulevard.
One Hundred and Sixty-third street, between Sherman and Morris avenues.
Boscobel avenue, between One Hundred and Sixty-ninth and One Hundred and Seventieth streets.
One Hundred and Sixty-seventh street, between Woodycrest and Anderson avenues.
Clinton place, between Jerome avenue and Aqueduct avenue East.
One Hundred and Forty-sixth street, between Walton and Gerard avenues.
Summit avenue, between One Hundred and Sixty-first and One Hundred and Sixty-fifth streets.
One Hundred and Eighty-sixth street, between Third and Park avenues.
One Hundred and Forty-fourth street, between Mott and River avenues.
One Hundred and Forty-third street, between Lenox and Seventh avenues.
One Hundred and Forty-fourth street, between Lenox and Seventh avenues.
One Hundred and Forty-first street, between Southern Boulevard and Walnut avenue.
Walnut avenue, between One Hundred and Fortieth and One Hundred and Forty-first streets.
One Hundred and Seventy-eighth street, between Hughes and Lafontaine avenues.
One Hundred and Thirty-ninth street, between Fifth and Lenox avenues.
Fifth avenue, between One Hundred and Thirty-eighth and One Hundred and Fortieth streets.

Repairing and Renewal of Pipes, Stop-cocks, etc.—Amount of Pipe Laid, Stop-cocks set and Hydrants Placed during the Year 1903.

DIAMETER OF PIPE.	Linear feet laid during quarter ending Dec. 31, 1903.	Linear feet laid during year 1903.	DIAMETER OF STOP-COCKS.	Set during quarter ending Dec. 31, 1903.	Set during year 1903.	PATTERN OF HYDRANT.	Placed during quarter ending Dec. 31, 1903.	Placed during year 1903.
20-inch.....	.....	12.8	12-inch.....	5	..	Double Nozzle, N.Y....	17	58
12-inch.....	22.0	91.0	6 inch.....	5	11	Matthews	1	5
6-inch.....	302.0	550.0	4-inch.....	25	22	No. 1.....	..	1
4-inch.....	97.0	97.0	.....	..	30	Double Nozzle "A".....	..	2
					..	Eddy	..	2
Total	422.0	750.8	.....	35	63	.....	18	68

Deduct Abandoned.

500 feet 12-inch Pipe.
770 feet 6-inch Pipe.
1 12-inch Stop cock.
1 6-inch Stop-cock.
3 Double Nozzle "A" Hydrants.
29 No. 1, 2, 3 Hydrants.
15 "A" Hydrants.
6 "B" Hydrants.
1 Victor Hydrant.
10 Miscellaneous.

Fourth Quarter, 1903—Work Done by Regular Repair Gangs, Including O'Connell's.

22 linear feet 12-inch pipe laid.
303 linear feet 6-inch pipe laid.
97 linear feet 4-inch pipe laid.
17 additional New York hydrants set.
1 additional Matthew hydrants set.
17 New York hydrants set in place of defective hydrants.
5 new 12-inch gates and boxes set.
5 new 6-inch gates and boxes set.
25 new 4-inch gates and boxes set.
1 12-inch gate replaced.
3 20-inch gates cleaned and greased.
1 6-inch gate cleaned and greased.
1 48-inch main repaired.
4 12-inch mains repaired.
1 6-inch main repaired.
2 16-inch gates repaired.
6 taps changed from old to new mains.

Note—5 "A" hydrants abandoned; 9 Nos. 1, 2, and 3 hydrants abandoned; 3 "B" hydrants abandoned; 2 case hydrants abandoned.

Annual Report, 1903.

12.8 linear feet of new 20-inch pipe laid.
91 linear feet of new 12-inch pipe laid.
550 linear feet of new 6-inch pipe laid.
97 linear feet of new 4-inch pipe laid.
58 additional New York hydrants set.
1 additional No. 1 hydrant set.
2 additional "AA" hydrants set.
5 additional Matthews hydrants set.
2 additional Eddy hydrants set.
62 New York hydrants set in place of defective hydrants.
3 "AA" hydrants set in place of defective hydrants.
9 New York hydrants replaced.
11 new stopcocks and boxes set (12-inch).
22 new stopcocks and boxes set (6-inch).
30 new stopcocks and boxes set (4-inch).
1 20-inch stopcock replaced.
5 12-inch stopcocks replaced.
2 6-inch stopcocks replaced.
2 48-inch stopcocks repaired.
1 36-inch stopcock repaired.
1 24-inch stopcock repaired.
13 20-inch stopcocks repaired.
2 16-inch stopcocks repaired.
5 12-inch stopcocks repaired.
6 6-inch stopcocks repaired.
2 hydrants repaired.
5 48-inch mains repaired.
7 36-inch mains repaired.
1 20-inch main repaired.
4 12-inch mains repaired.
1 6-inch main repaired.
15 48-inch stopcocks cleaned, greased and oiled.
26 36-inch stopcocks cleaned, greased and oiled.
15 30-inch stopcocks cleaned, greased and oiled.
15 24-inch stopcocks cleaned, greased and oiled.
58 20-inch stopcocks cleaned, greased and oiled.
1 16-inch stopcock cleaned, greased and oiled.
5 12-inch stopcocks cleaned, greased and oiled.
3 6-inch stopcocks cleaned, greased and oiled.
6 taps changed from old to new mains.

INTERURBAN STREET RAILWAY COMPANY.

Amount of Pipe Laid, Stop-cocks Set and Hydrants Placed during the Year 1903.

DIAMETER OF PIPE.	LINEAR FEET LAID DURING QUARTER ENDING DECEMBER 31, 1903.	LINEAR FEET LAID DURING YEAR 1903.	DIAMETER OF STOP-COCK.	SET DURING QUARTER ENDING DECEMBER 31, 1903.	SET DURING YEAR 1903.	PATTERN OF HYDRANT.	PLACED DURING QUARTER ENDING DECEMBER 31, 1903.	PLACED DURING YEAR 1903.
12-inch.....	10,113	25,303	12-inch.....	45	97	Double Nozzle, N. Y....	25	95
6-inch.....	318	1,424	6-inch.....	..	14	Single Nozzle, N. Y.....	..	5
Totals...	10,431	26,727	.....	45	111	.....	25	100

Deduct Abandoned.

19,725 feet 6-inch Pipe.
40 feet 6-inch Stop-cocks.
20 feet "A" Hydrants.
28 feet Nos. 1, 2 and 3 Hydrants.
7 feet Double Nozzle "B" Hydrants.
4 feet Double Nozzle "A" Hydrants.
5 feet Double Nozzle N. Y. Hydrants.

Mains Laid by Interurban Railway Company.

12-Inch Pipe.

Eighty-sixth street, between Avenue A and Second avenue.
Eighty-fifth street, between Madison and Fifth avenues.
Second avenue, between Houston and Tenth streets.
Christie street, between Grand and Houston streets.
Forsyth street, between Grand and Houston streets.
Forty-second street, between Tenth avenue and North river.
Tenth avenue, between Thirty-fourth and Forty-second streets.
Thirty-fourth street, between Second and Ninth avenues.
Fourteenth street, between Avenue A and First avenue.

Interurban Street Railway Company.
Linear Feet Pipe Laid.

12-inch	25,303
6-inch	1,424
Total	26,727

Stop-Cocks Set.

12-inch	97
6-inch	14
Total	111

Hydrants Placed.

Double nozzle, New York.....	95
Single nozzle, New York.....	5
Total	100

Department of Water Supply, Gas and Electricity,
Office of Chief Engineer, Nos. 13 to 21 Park Row,
New York, December 22, 1903.

NICHOLAS S. HILL, Jr., Esq., Chief Engineer, Department of Water Supply, Gas and Electricity, City of New York:

Sir—I present herewith a brief outline of the water-waste investigation conducted under my supervision during the past year.

My work was begun, by your instructions, in November, 1902, at which time the pitometer was first employed in New York. During these tests there have been in use three or more pitometers under rental by your Department. I have accomplished the field work and calculations in connection with these instruments with one assistant.

Floating gang No. 2 (Foreman, John Hoyne), under the able direction of Assistant Engineer John E. Deignan, of the Water Department, has set all pitometer boxes, tapping the mains for the attachment of the pitometers and closing all district gates, as well as making the night inspection of sewers.

The measurement of fixture leakage throughout the City has been accomplished by a force of from ten to twenty Inspectors, detailed by the Water Register, under the direction of Mr. John Reilly. Meter statements, as required in connection with our district reports, have been taken by the regular Meter Readers of the Register's Bureau.

A complete description of the water-waste investigation has appeared in detail in your reports, and I will therefore give but a brief summary of our operations.

Waste districts Nos. 1, 2, 3, 5, 6, 7, 8, 9, 10, 11 and 12 have been laid out, and their rate of total consumption recorded by pitometers, as described by you in your reports. The dates for each of these tests appear upon the blue-print schedule of our tests presented herewith.

In addition to the above districts, complete resurveys have been made as follows:
District No. 1, retested on December 21-22, June 9-10.
District No. 3, retested on May 1-6.
District No. 7, retested on July 24-28.
District No. 10, retested August 18-20.
District No. 9, retested on August 22-24.

Two additional districts, Nos. 13 and 14, have been laid out and the pitometer measurements of flow completed; but owing to the lack of statistics from the Water Register, complete reports are not available. District No. 13 was tested on August 1 and 9; No. 14 on November 11 to 20 and 27 to 30.

The boundaries of these districts are as follows:
No. 13—Forty-second to Fifty-ninth street, Second avenue to Fourth avenue.
No. 14—Fourteenth to Twenty-ninth street, Sixth avenue to Ninth avenue.

Although complete statistics from the Water Register have not yet been received for District No. 13, I may report the following results:
Total consumption registered by pitometer, per day, 3,721,000 gallons.
Total population counted by Waste Inspectors, 57,983.
Per capita consumption daily, 64 gallons.
Aggregate fixture leakage, as shown by house-to-house inspection, in gallons, per day, 711,000 gallons.
In the house-to-house inspection for leakage, 2,823 buildings were examined.

Regarding District No. 14 I can only report that the total daily consumption by pitometer measurement is 3,748,000 gallons. The statistics of population, revenue, leakage, etc., are not yet complete.

Since your last report on water waste (August), I have made several subdivision tests in various districts, as follows: The lower half of District No. 9 was subdivided at the close of the regular test, on the night of August 23-24. This revealed a large

consumption in Section No. 5, including the Ansonia Hotel, at Seventy-third street and Broadway. An examination of the meters in this section indicated a large use unaccounted for. The first subdivision was conducted while recording the total supply by pitometer at Eighty-sixth street, and in order to make a more thorough test we placed pitometers in Seventy-third and Seventy-fourth streets, at West End avenue, thus supplying the suspicious section at short range. A continuous record of consumption was there made from December 6 to 9, at the same time taking meter statements both night and day. The following is a brief summary of results:

September 10 to 25, average gallons daily, 52,758; records of the Department.

September 25 to December 7, average gallons daily, 53,508; records of the Department.

December 7 to 9, average gallons daily, 239,000; special meter readings.

December 7 to 9, average gallons daily, 269,000; by pitometer, including a few residences in Seventy-third and Seventy-fourth streets.

December 9, night rate, gallons daily, 173,000; special meter readings.

December 9, night rate (pitometer), 200,000; including residences as above.

September 24, night rate, 137,000; by pitometer, subdivision.

September 24, night rate, 7,000; by Ansonia meters.

From the foregoing it is clear that the rate of consumption by the Ansonia Hotel meters continued at about 53,000 gallons per day until the time of our test, when the rate suddenly increased to 239,000 gallons daily. At this time an Inspector reported one of the large meters in the Ansonia Hotel out of order, stating that the hood of the meter had been removed and the clock mechanism of the meter displaced, so as to allow no registration.

Regarding the foregoing comparison of the pitometer rate with the meter readings from December 7 to 9, it should be borne in mind that the pitometer registered the supply for two blocks of residences, between Broadway and West End avenue. Making a reasonable allowance for the small domestic consumption here, we have a satisfactory proof that the meters were then registering the full supply.

Suspicion was attracted to the Ansonia meters by the fact that on the night of the subdivision of District No. 9 (September 25), the small subsection, No. 5, comprising this hotel, indicated a night rate of 137,000 gallons daily; whereas, the meters carefully read the same night showed a rate of only 7,000 gallons. I am informed that a 4-inch and 2-inch meter have been removed from the Ansonia Hotel for repairs.

The subdivision of District No. 12, comprising several large breweries, was made on October 13 to 14, during which time careful meter readings were made and compared with the gross supply as measured by pitometers located in Third avenue at Ninety-first and Ninety-third streets. The average consumption of this small section in gallons daily was found to be 535,000; the total registration of 48 meters within the district showed a rate of 513,000 gallons, or 96 per cent.; hence, allowing for the small domestic consumption necessarily included within the brewery district, we see that the actual brewery consumption was fully metered.

A small subdivision of District No. 8 was made, including Liberty street, from Greenwich to West street, and West street, from Cortlandt to Cedar. This section included some of the oldest pipe in the City, laid in low, wet ground, where it was expected that some main leakage might be revealed. Great care was used in tightly inclosing this section, and observations of the rate of inflow were made. A characteristic feature of this test is the extremely low rate of night consumption observed. There was practically no flow observable in this section after midnight.

A subdivision of District No. 8 was attempted, including Pine and Cedar streets, from Nassau to Pearl, but unfortunately it was impossible to read many of the meters in this section at night. We were therefore unable to judge whether or not the total consumption registered was fully accounted for by meter registration.

I present herewith a tabulated statement of all district tests and resurveys.

Respectfully submitted,

EDW. S. COLE.

New York, August 28, 1903.

Hon. ROBERT GRIER MONROE, Commissioner, Department of Water Supply, Gas and Electricity, Park Row Building, New York City:

Dear Sir—I beg herewith to submit for your consideration my third report on the water waste investigations which have been carried on from December, 1902. Since my last report, at which time eight districts had been (9 inclusive) covered, four additional districts have been surveyed, one additional (13) district completed (except for the financial statistics, which have not been received from the Water Registrar's office), two districts have been resurveyed (3-7) for purposes of comparison, and a resurvey of a third district is nearly finished (10). The total area included to date in Manhattan is about 1,400 acres, or 11.5 per cent. of the area of the island. As this area includes districts representative of typical sections of the borough, such as a down-town business, an East Side tenement house, the Murray Hill, an upper West Side apartment house district, and others, some idea may be had of the general conditions prevailing. In addition special investigations have been made upon the high service district as a whole, tests have been conducted at the several pumping stations in Manhattan to determine the correct amount pumped at the various stations, and extensive tests have been commenced in conjunction with Mr. Watkins, Division Engineer of the Aqueduct Commission, for the purpose, if possible, of determining the exact total flow of water through the aqueduct, with the water at different levels. Mr. Cole, with the pitometer placed on all large mains leading to the City, has taken readings on the same days and at the same intervals with Mr. Watkins, who took readings from a Fteley current meter at a point on the new aqueduct below Dunwoodie.

Herewith you will find a map showing the boundaries of the thirteen different districts so far worked upon, twelve of which have been completed and four resurveyed.

Some unavoidable delays have been caused by the reduction of the force of plumbing inspectors, due to want of necessary funds, and the withdrawal of the sewer gang for several weeks, owing to the necessity of their presence on work involved by several serious breaks in mains which have occurred since May 30.

In the last report several matters of importance and interest were referred to, such as the effect the class of population has upon the per capita consumption, the reduction in the rate of per capita consumption caused by considering and including in all estimates the large non-resident population in many sections of New York, the effect of frontage rates on the reduction in water revenue, waste due to leaky plumbing, etc. The results of further investigation only stimulate the views expressed on these matters.

The reduction in the per capita consumption as a result of considering the non-resident population in District No. 1 (Murray Hill), as shown in the report of March 31, is even more forcibly exhibited in District No. 8. According to the census returns, the population of the No. 1 District was 8,396. The non-resident population estimated by canvass, 3,760. The net per capita consumption in the last survey of this territory, based on resident population, was 170, and including the total population, 117.5 gallons per day.

In District No. 8, which includes the area between Fulton street and the Battery and from East to North river, the resident population is 11,000, and the non-resident, determined by canvass, 103,000.

The net per capita consumption, after deducting leakage for resident population, 825, and for resident and non-resident, 79.2 gallons per day.

The survey of the last-named territory also developed a large consumption of water for power purposes. A canvass of all buildings was made to determine the total horse power represented for lighting, heating and power purposes. Incidentally a tabulation was made of the total number of faucets, closets, urinals and other fixtures, which is interesting as showing the lavishness of American practice in this regard, both in commercial and residential buildings. A table follows, giving the results of this canvass:

Summary—Special Inspection of District No. 8, February 20 to March 13, 1903.

Number of buildings examined	2,094
Number of buildings metered	1,972
Total floor space, ground floor, square feet	4,945,172
Total number of floors	10,386
Total number of closets	13,066
Total number of urinals	5,396
Total number of faucets	33,547
All fixtures	52,009
Private plants for light	111
Private plants for heat	337
Private plants for power	160
Number of electric elevators	227
Number of hydraulic elevators	421
Number of steam elevators	59
Number of gas elevators	4
Number of belt elevators	2
Number of water tanks	791
Total capacity in gallons	1,243,712
Measure of leakage in fixtures, gallons	423,764
Number of leaking closets	1,210
Number of leaking faucets	728
Horse power of boilers in use	44,340
Water used for power purposes, gallons daily	1,750,000
Avenue power factor, 40 per cent., gallons, per capita	15.3
Net per capita consumption, based on total population and corrected for power purposes, daily	64

It is seen from the foregoing that 15.3 gallons are used for the development of power, reducing the consumption for other purposes to 64.2 gallons per capita per day. The small percentage of leaking closets and faucets in this area is interesting to note, there being but 1,938, with a total of 52,009 fixtures; the gross leakage is only 423,764 gallons, or 4.47 per cent. of the total consumption. The total consumption is 9,450,000 gallons per day.

This, in conjuction with the fact that 1,987 buildings out of 2,384 are metered, and only 5,379,000 gallons per day are accounted for by the meter records of the Department, leads to one of three conclusions: Either the main leakage in this district is excessive, the buildings supposed to be covered by meters are obtaining water through other connections unrecorded, or the meters are defective.

Undoubtedly the mains in this district are old and probably in bad repair, but owing to the condition of the valves and the manner of making the service connections, it was impossible to subdivide the territory and explore for defective mains. The per capita consumption, however, in comparison with other districts and cities, is not high, and not what might be expected when it is considered that in addition to the non-resident population accounted for there are thousands of transients who spend the working day and lunch in this vicinity.

There probably is leakage from mains, but my analysis would tend to show the great discrepancy is due largely to one or two of the latter causes, and is an additional argument in favor of furnishing the necessary funds to provide for an adequate and competent corps of inspectors to properly care for meters and metered connections.

The condition of the meters and services is also largely due to the fact that the City, contrary to the custom in most American cities, allows the plumber to make the connections and set the meter, and the meter is owned by the owner of the premises. The City should control all meters and services and keep them in proper repair.

Attached will be found curves showing the variation in consumption during the continuance of the test in this district.

As further illustrating the effect of industrial and commercial use upon the consumption of water: In District No. 7 there is a total of but 295 buildings in an area of 260 acres, of which 251 are unmetered and 44 metered. The unmetered consumption in this district on the last test was 766,100 gallons; the metered 776,900, or slightly more. The 44 meters represent almost exclusively manufacturing plants or railroad yards, and as a result the per capita consumption is doubled. The investigations in this district developed the fact that one large consumer supposed to be metered had connections back of the meter. The effect of the discovery is shown in a comparison of the two surveys, one made before and one after the connections were changed.

	First Test.	Second Test.
Gallons metered daily	551,900	776,900
Gallons paid for frontage rates	1,048,100	766,100
Revenues from meter bills	$26,931 00	$37,910 00
Revenues from frontage rates	3,858 00	3,858 00
Total revenue	$30,789 00	$41,768 00
Revenue per 1,000 gallons	$0 055	$0 0742
Night rate of net unmetered consumption per capita	229	106 09

While the resurvey indicated no diminution of the per capita consumption, which is high, probably due to the fact that other similar connections may be discovered, which would show the water is used for commercial purposes, at the same time the table is most interesting as demonstrating the results derived from careful inspection and measurement. The mains in this district are new. The sewer inspections and other tests revealed no main leakage, and the house leakage is small, so that continued investigation will lead rather to increased revenue than decreased consumption.

The great reduction in the night rate of net unmetered consumption per capita shows how easily results may mislead. In the first test, water which should have been metered and accounted for in commercial consumption was charged to frontage, making a high per cent. of night to average flow which would indicate heavy leakage. This does not exist.

Another illustration of the same kind may be found in District No. 12, including the area between Eighty-sixth and One Hundred and Third streets and Second avenue and East river. The nominal consumption in this section as measured is 2,750,000 gallons, which equals 51.3 gallons per capita net. Located in the district is a large power house which uses 1,500,000 gallons per 24 hours. This water should be rightfully added to the consumption. The amount was large, however, and in view of the fact that a through 48-inch trunk main serving a district further downtown passed near the station and the pressures were then low in the area in question, connection was made to the 48-inch pipe. If this were added we have a net per capita of 90 instead of 51.3 gallons per day as the true consumption. Put in another form, the per capita use of No. 12 District, with 40,000 population, is nearly doubled by one station. The commercial use of water in this area, adding the supply of this station, is 62 gallons per capita per day. This 62 gallons represents metered water. Referring again to the effect of non-resident population upon per capita consumption, it may be conservatively estimated that 600,000 people come to Manhattan daily. The per capita consumption in Manhattan is about 129 gallons; if this population is included this figure is reduced to 99.6 gallons per day.

A further study of the situation does not reveal a large leakage in the mains. The sewer and subway inspections revealed nothing serious. In the No. 8 District, where the mains are probably in a worse condition than elsewhere in the City, actual readings were made on meters in buildings between 8 p. m. and 5 a. m., with the result that the ratio of night consumption to the average for twenty-four hours was 50 per cent., while the same ratio on the total consumption is 59.3 per cent., or approximately the same. This indicates a small main leakage. While we are not prepared to make any definite statement as yet about this leakage, or until we can get the valves and mains in proper condition to make more exhaustive tests, the theory that this source of waste is not large is continually strengthened by our observations.

On the other hand, the lack of proper supervision of the plumbing has led to serious losses. In the last report the waste from this source was estimated at 32,000,000 gallons per day. The information subsequently obtained would tend to increase this

amount to 42,000,000. This represents the actual daily loss due to faulty fixtures. In addition, owing to the class of plumbing tolerated, much water is wasted on account of the custom of opening fixtures to prevent freezing in winter. In summer a large amount is lost in cooling the water. In a majority of houses it will be found that the hot and cold water risers are placed side by side in a common trough. Owing to the poor system of circulation a large quantity is run in an endeavor to obtain hot water. These conditions cannot be improved to-day without great expense to the property owner and a movement to effect a change at this date would probably meet with forceful opposition. It is possible for the City, however, to pass the proper plumbing laws and employ capable Inspectors who will see that only good work is installed hereafter. It is impossible to estimate this loss, but it is safe to assume that it will almost equal the waste due to faulty fixtures.

Figuring on this basis, therefore, for the purpose of arriving at a preliminary but not by any means final conclusion, we have:

Per capita consumption of Manhattan, resident population	129
Per capita consumption of Manhattan, resident and non-resident	99
Per capita consumption after deducting losses due to faulty fixtures and plumbing	68
Deducting 15 gallons per day for power uses (which is low), the per capita consumption for all domestic and commercial purposes, including main leakage, is	53

Department of Water Supply, Gas and Electricity,
Office of the Chief Engineer, Nos. 13-21 Park Row,
City of New York, December 4, 1903.

NICHOLAS S. HILL, Jr., Esq., Chief Engineer, Department of Water Supply, Gas and Electricity, City of New York:

Dear Sir—In reply to your request of November 30, I respectfully submit the following summary for the year 1903:

95.96 miles of sewers were examined in fourteen (14) districts throughout Manhattan and The Bronx.

2,194 house connections were found wasting.

30 leaks were also found and corrected.

The following table shows the gates inspected and used during the year:

Size of Gates.	Quarter Ending March 31.	Quarter Ending June 30.	Quarter Ending Sept. 30.	Quarter Ending Dec. 31.	Total for Year 1903.
4-inch	7	4	40	55	106
6-inch	775	1,110	1,366	1,194	4,445
8-inch	.....	.....	6	.....	6
10-inch	2	.....	7	1	10
12-inch	301	382	580	457	1,720
14-inch	.....	.....	.....	1	1
16-inch	.....	1	2	24	27
20-inch	24	53	137	61	275
24-inch	11	7	8	4	30
30-inch	2	8	20	2	32
36-inch	15	19	35	4	73
48-inch	.....	5	14	2	21
Total	1,137	1,589	2,215	1,805	6,746

Respectfully,
JOHN E. DEIGNAN, Transitman.

New York, December 3, 1903.

N. S. HILL, Jr., Esq., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Sir—I respectfully present for your approval the Yearly Report, ending December 31, 1903, as to completed work by the seven (7) repair companies attached to the Bureau of Chief Engineer:

New hydrants set		631
Old hydrants repaired		11,690
New stop-cocks set		73
Old stop-cocks set		1,475
Croton mains repaired		890
Taps shut off (service pipe broken or leaking)		1,143
Hydrants found improperly closed (closed same)		1,781
Linear feet pipe used in repairing old mains		2,940
Permits issued to tap on Corton mains, Manhattan	1,215	
Permits issued to tap on Croton mains, The Bronx	872	
		2,087
Old city horse troughs repaired by City Plumber		100
Old city horse troughs replaced by new ones		5
New city horse troughs set		4
Bartholomew hydrants removed		....

Permits to place Smith or Ely connections on City mains, as follows:

2-inch connections	128	
3-inch connections	11	
4-inch connections	16	
6-inch connections	2	
		157

Repairs computed for month of December, 1903, on basis of December, 1902.

Respectfully,
(Signed) JAMES MENAIR, Chief Inspector.

New York, December 4, 1903.

N. S. HILL, Jr., Esq., Chief Engineer, Water Supply, Gas and Electricity, New York City:

Sir—I respectfully submit for your approval report of completed work by the seven (7) companies attached to Bureau of Chief Engineer, for the quarter ending December 31, 1903; also report of permits to tap on City mains, and repairs to City horse troughs by City Plumber during that period:

New hydrants set	169
Old hydrants repaired	2,498
New stop-cocks set	40
Old stop-cocks repaired	350
Mains repaired	295
Taps shut off, service leaking or broken	267
Hydrants improperly closed after use (closed same)	398
Linear feet of pipe used to repair mains	1,081
Permits to tap on City mains, Manhattan	285
Permits to tap on City mains, The Bronx	168
City horse troughs repaired	18
New city horse troughs set	1
Old city horse troughs replaced by new ones	1
Permits to place Smith or Ely connections on City mains:	
2-inch	34
3-inch	5
4-inch	4

Month of December, 1903, averaged on basis of work for December, 1902.

Respectfully,
(Signed) JAS. MENAIR, Chief Inspector.

Long Island City, N. Y., December 4, 1903.

NICHOLAS S. HILL, Jr., Esq., Chief Engineer, Water Supply, Gas and Electricity, New York City:

Dear Sir—In compliance with your request of December 1, I herewith submit report as to the condition of the water distribution system in this borough, and of the work done therein during the year ending November 30, 1903. In the matter of measurement of water consumed in the First Ward of this borough, I find on the books of this Department 12,000 accounts, of which 500 are meter accounts, the remainder being charged at frontage rates.

The accounts in the Third Ward number 3,600, of which 2,800 are meter accounts.

In the First Ward I find that owing to the absence of meters in various small establishments, principally saloons, adequate payment for the amount of water used is not being received, and would recommend that it be made obligatory on the part of such water users to place meters on their premises.

With reference to the present distribution system in the First Ward, I would respectfully call your attention to the very meagre supply we are receiving not only from the pumping stations of this Department, but also from private water companies as evidenced by pressures taken December 1 last at different points, a table of which is appended.

Aside from the dangers incidental to such a condition, I find that owing to the insufficient sizes of mains in many districts of this ward, proper circulation is not received. This fact was clearly demonstrated at a fire which occurred November 24 last, resulting in a loss of $300,000, and at which fire the five fire engines employed were unable to obtain an adequate supply of water. This condition exists in many districts in Long Island City, and demands the use of larger mains for protection from fire, and to promote proper circulation.

We have at present on file in this office, fifty-eight applications for the laying of water mains in this ward, occasioned by the increased number of houses erected in residential districts. I trust that sufficient funds will be provided for in the near future to meet this urgent necessity.

The destruction of Station No. 2 by the recent boiler explosion has necessarily caused a serious shortage of water in this vicinity, and although we have attempted to supply this deficiency by laying large circulating mains on Grand avenue, between Old Bowery Bay road and Franklin street, Astoria, the supply has not been increased sufficiently. This supply we hope will be augmented when we secure an additional supply from the wells of the Bowery Bay Building and Improvement Company, according to the contract just entered into.

In the matter of new mains laid in this ward, I would report that during the past year we have laid under public award 9.01 miles of same, with necessary hydrants and gate valves, for a detailed statement of which I would refer you to table appended.

With reference to the improvement of buildings, etc., in the Corporation Yard at Willow street, this ward, I would say that we have received bids for the same, and will proceed with the work when sufficient funds are available.

The distribution system in the Third Ward is in fairly good condition, and when the circulating main, already contracted for, from Flushing stand pipe to the Village of College Point is laid, adequate protection for some time to come will be afforded in this vicinity.

The main at present furnishing the supply to the Village of College Point has of late years been a source of much trouble and fear, owing to the electrolytic effect produced therein by escaping electric currents from the trolley road which parallels this main for a great distance, decomposing the main, and thereby causing much leakage in the same.

Anticipating an increased supply owing to the improvements now being made at the Bayside and Flushing Pumping Stations, I would recommend the laying of a 20" main from the Bayside Pumping Station, and a 16" main from the Flushing Pumping Station to join at Cemetery lane and Broadway. From this point to the stand pipe in Flushing a 24" main will be necessary. An estimate in advance as to the cost of this improvement will be about $200,000. I would also recommend that speedy attention be given to the matter of relaying the flexible joint pipe crossing Little Neck Creek, as the same is at present in a very leaky condition. As to increased fire protection in this ward, I feel that action should be taken as soon as possible to increase the hydrant service, especially in the vicinity of Douglaston and Bayside, owing to the fact that many new and valuable residences have been erected there during the past year. With the above mentioned improvements in operation, I feel that, aside from laying new service mains, this ward will be adequately cared for.

During the past year we have laid in this ward 2.41 miles of water main, with necessary hydrants and valves, a statement of which is appended.

The building and grounds on Leavitt street in this ward are in excellent condition, and provided with all that is necessary to maintain good water service.

The repair gang in the First Ward, aside from their general work, is employed in lowering mains and hydrants to meet the requirements of changed grades in the various streets. The force employed on this work is composed of 2 Calkers, 1 Toolman, and 6 Laborers. In the Third Ward, the repair gang, when not engaged in their regular work, have been employed at the Pumping Stations in preparing the ground for proposed improvements at these points. The force employed is 1 Tapper, 1 Calker, and 4 Laborers. Appended you will please find detailed statement of the character and amount of work performed.

The Engineering Corps connected with this office during the past year has been engaged in conducting contracts under way, and in making surveys, plans, and estimates for work proposed, also in conducting work made necessary by water main extensions under the control of private water companies.

In connection with this Department I would say that the services of a competent Draughtsman are very much needed to compile proper pipe maps of the distribution systems in each ward, as also to perform work of a like character incidental to this office. Appended you will please find a table showing details of work completed in this Borough during the past year.

Yours respectfully,
(Signed) JOHN A. BYRNE,
Engineer-in-Charge, Borough of Queens.

DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY, BOROUGH OF QUEENS.

Work Completed Under Public Award During the Year 1903.

Contractor.	Ward.	Date of Contract.	Date of Completion of Work.	Cost of Work.	Miles of Mains Laid.	No. of Hydrants Set.	No. of Gates Set.
Lloyd Collis	First	Dec. 30, 1902	Oct. 3, 1903	$27,472 60	2.94	63	30
F. N. Lewis	First	Dec. 30, 1902	Oct. 21, 1903	31,188 75	3.56	82	41
Norton & Dalton	First	Jan. 2, 1903	Sept. 15, 1903	33,529 95	2.51	32	25
Peace Bros.	Third	Dec. 30, 1902	Aug. 19, 1903	15,131 48	2.41	26	9
Total				$107,322 78	11.42	203	105

BOROUGH OF QUEENS.

Statement of Fire Hydrants for Which the City Pays Rental to Private Water Companies.

Name of Company.	Rate.	No. in Use Jan. 1, 1903.	No. Set in 1903.	Total.	Total Annual Cost.
Citizens' Water Supply Company.....	$25 00	100	....	100	$2,500 00
Citizens' Water Supply Company.....	20 00	308	33	341	6,820 00
Citizens' Water Supply Company.....	18 00	140	....	140	2,520 00
Jamaica Water Supply Company.....	18 00	675	52	727	13,086 00
Queens County Water Company.....	20 00	256	14	270	5,400 00
Woodhaven Water Supply Company....	18 00	496	127	623	11,214 00
Total.....		1,975	226	2,201	$41,540 00

Note—In addition to the above, a number of hydrants have been ordered, but not yet set.

Table of Water Pressures Taken December 1, 1903, at Various Places in the First Ward, Borough of Queens.

Corner Franklin and Wardell streets, pounds	19
Corner Franklin and Halsey streets, pounds	36
Corner Flushing and Steinway avenues, pounds	15
Corner Grand and Steinway avenues, pounds	10
Corner Thomson avenue and Old Bowery Bay road at meter, pounds	4
Corner Laurel Hill at meter, pounds	8
Corner Greenpoint and Hunterspoint avenue, pounds	10
Borden avenue and Dutchkills creek, pounds	30
Fifth street, opposite Borough Hall, pounds	17

BOROUGH OF QUEENS.

Statement of Lengths of Water Mains in Use December 31, 1902; Lengths Added to November 1, 1903, and Total Lengths in Use November 1, 1903, with Number of Stop-cocks and Hydrants.

Sizes of Mains and Stop-cocks.	Mains in Use Dec. 31, 1902. Linear Feet.	Additions to Nov. 1, 1903. Linear Feet.	Total Mains in Use Dec. 31, 1903. Linear Feet.	Stop-cocks in Use Dec. 31, 1902.	Additions to Nov. 1, 1903.	Total No. in Use Nov. 1, 1903.
20 inches.....	845	.....	845	1	.....	1
16 inches.....	4,725	.....	4,725	5	.....	5
14 inches.....	2,640	2,362	5,002	1	2	3
12 inches.....	62,104	20,826	82,930	25	35	60
10 inches.....	31,789	.....	31,789	34	1	35
8 inches.....	95,174	13,134	108,308	130	41	171
6 inches.....	237,399	30,814	268,213	342	70	412
4 inches.....	64,013	.....	64,013	53	.....	53
Totals	498,689	67,136	565,825	591	149	740
Hydrants in use December 31, 1902						876
Additions to November 1, 1903						243
Total in use November 1, 1903						1,119

December 10, 1903.

NICHOLAS S. HILL, Jr., Esq., Chief Engineer, Department of Water Supply, Gas and Electricity, New York City:

Dear Sir—I herewith submit a statement showing the present condition of the work on the contracts of A. C. Gildersleeve and Nicholas W. Ryan at Jerome Park Pumping Station:

Foundations—Contract dated October 26, 1899, A. C. Gildersleeve, contractor.
Estimated cost, $74,556.90. Time allowed, 200 days.
Amount of estimates to date, $74,669.50.
The work remaining to be done includes:
Grading adjacent grounds.
Furnishing and setting iron railing.
Furnishing and setting cast-iron leader pipes in tool house and in gate vault.
Furnishing and setting two wrought-iron doors.
Furnishing and setting curb on Jerome avenue.

Extensions of time have been granted this contractor, as it was not deemed practicable to finish the work before the completion of the building.

Superstructure—Contract dated October 4, 1902, Nicholas W. Ryan, contractor.
Estimated cost, $97,750. Time allowed, 300 days.
Amount of estimates to date, $84,000.

This contract is nearing its completion. Very little material remains to be furnished, and such material as has been delivered is almost all in place.

The work remaining to be done includes:
Placing remainder of wrought iron in roof and slating entire surface.
Glazing of windows.
Tiling engine-room floor and top of tower.
Metallic ceiling in engine room and boiler room, cornice and gutter painting.

Work is also being done on Amboy road, Borough of Richmond, in the laying of a 12-inch main from the Tottenville standpipe, under contract awarded to Clinton Beckwith, September 15, 1903.
Estimated cost, $97,750. Time allowed, 300 days.
An estimate for $16,000 is being prepared.

This contract is now well under way. About 1,500 feet of trench have been opened, and 12-inch pipe laid therein; 370 tons of straight pipe and specials and nearly all the hydrants and gates are on the ground.

Yours respectfully,
(Signed) M. LORINI, Assistant Engineer.

"III."

Department of Water Supply, Gas and Electricity for the Borough of Brooklyn.
Brooklyn, December 30, 1903.

Hon. ROBERT GRIER MONROE, Commissioner of Water Supply, Gas and Electricity:

Dear Sir—I beg to report to you the work of your Department in the Borough of Brooklyn for the year 1903 by transmitting to you the reports of the chiefs of the various bureaus in charge of the work in this Borough, whose reports have been prepared after consultation with me. These reports set forth in some detail the work accomplished during the past year and its present status. I attach hereto as a part of this annual report the following reports from the bureaus:

Office of Supplies and Accounts.
Bureau of Chief Engineer,
Bureau of Distribution and Repairs,
Bureau of Water Rates,
Bureau of Electricity and Gas,
Electrolysis Investigation, and
Bureau of Lamps and Lighting.

Bureau of the Chief Engineer.

The report of the Chief Engineer, Mr. de Varona, in his statement of the work acomplished during 1903 and of the contracts prepared to take advantage of the appropriations for new work obtained by you from the Board of Estimate and Apportionment, indicates a fair measure of fulfillment of the policy adopted by you for the betterment of the supply and distribution of water for the Borough of Brooklyn. The problem as presented by the local conditions was two-fold. While the immediate necessity seemed to be for the replacing of old, inadequate mains, many of which were placed in the ground fifty or more years ago, it was yet apparent that along with an improvement in the means of distribution, there should be pursued the work of increasing the supply. The work of the Department has now advanced so far that I am convinced that, if it is prosecuted from now on energetically and intelligently, the year 1904 will mark the existence of conditions which, if not perfect, will at least meet the present requirements of Brooklyn for an adequate supply of water and its proper distribution throughout the Borough.

Bureau of Distribution and Repairs.

An unusual amount of work in this Bureau has been made necessary by the conditions existing on Atlantic avenue, both in connection with the building of the subway in that street and the new mains which are being laid under contract with the Department. In addition to the work of repair 9,950 feet of new water mains were laid by the force stationed at the various repair yards, and 2,524 feet of pipe has been either relaid or lowered. Particular attention has been given by the Bureau to the care of the hydrants throughout the Borough; 5,367 hydrants have been repaired, and 560 hydrants have been set.

Bureau of Electricity and Gas.

The most important work of this Bureau, aside from the care of the routine of inspection and the issuance of permits, has been in connection with the orders issued by you in accordance with the resolutions of the Board of Estimate and Apportionment for the removal of overhead conductors and the construction of subways. I am in entire accord with the statement of the Electrical Engineer in his report that, while progress along this line has been substantial and of great value, the unsatisfactory conditions which exist in Brooklyn are so widespread that a continuance of the policy adopted by you is necessary, if appreciable relief is to be afforded. A most interesting and valuable work has been started by this Bureau, namely, the preparation of a map showing all sub-surface structures. In every kind of underground work, performed either by the City directly or by public service corporations, great inconvenience has been caused and much expense incurred because of the fact that there exists no reliable information as to the location and extent of existing underground structures. I am of the opinion that the completion of this map is one of the most important branches of work that could be undertaken by this Bureau in the future. The amount expended in the preparation of the map would be returned to the City within a very brief period if the methods employed in Philadelphia, Boston and other cities were here adopted, by which a fee is charged where the use of the map is required by companies or individuals.

Electrolysis Investigation.

The report of Henry F. Blackwell, Electrical Engineer in Charge of the Electrolysis Investigation, indicates the scope of the work which has been planned and inaugurated. Its technical character and the amount of careful preparation required in order to achieve satisfactory results has made it necessary to proceed slowly in the actual work of testing and investigation. The peculiar conditions in Brooklyn brought about by the operation of the electric railroads seem to require that a searching and adequate investigation of the effect of stray currents upon the water mains and other subsurface structures should be continued.

Bureau of Lamps and Lighting.

The work of this Bureau during the past year has been confined to the routine of inspection and the general care of the lighting systems of the borough. The lack of appropriation has prohibited any extensions of lighting. This condition of affairs was unfortunate in the extreme, as the growth of the borough has made necessary extensions and improvements in the lighting system. All applications for new lights have been investigated and reports placed on file showing the condition of the lighting in the neighborhood affected by the applications.

Office of Supplies and Accounts.

I referred in my last report to the organization of this Bureau and the policy adopted of concentrating all of the work of the Department relating to supplies and accounts in a single office. The importance of an intelligent and careful administration of this work is indicated by the accompanying report. Among other items reference may be made to the fact that in the twelve months ending December 31, 1903, there were passed 3,129 bills, amounting to $1,725,333.86, and 448 payrolls, amounting to $838,349.44. Contracts were executed during the same period amounting to $2,084,426.75. The expenditures for the year 1903 have been in excess of those of the previous year, owing to the large amount of additional work undertaken in the borough during the present year.

Yours truly,
ROBERT VAN IDERSTINE,
Deputy Commissioner, Borough of Brooklyn.

City of New York, Borough of Brooklyn,
Department of Water Supply, Gas and Electricity,
Chief Engineer's Office, Room No. 25, Municipal Building,
Brooklyn, N. Y., December 31, 1903.*

Mr. ROBERT VAN IDERSTINE, Deputy Commissioner of Water Supply, Gas and Electricity:

Dear Sir—The following report shows the condition of the water supply in this Borough and work done in connection with the same for the year ending December 31, 1903, and also the receipts (classifying only those for metered and unmetered water), and the expenditures provided for under the Water Revenue Budget prepared by this Bureau, as well as those items of the Tax Levy Budget chargeable to engineering work:

RECEIPTS.

	1902.	1903.
Regular water rates	$1,656,652 28	$1,548,901 09
Metered water rates	703,211 27	871,181 24
Defaults, etc.	58,489 33	57,621 48
Total receipts	$2,418,352 88	$2,477,703 81
Arrears returned to Receiver of Taxes	229,103 35	158,644 84
Total income	$2,647,456 23	$2,636,348 65

*A preliminary report for eleven months was made by the Chief Engineer on December 10, 1903. When the printer's proofs were brought for correction, this report, by request of the Commissioner, was changed so that the figures, tables, etc., would cover the whole year, and the date also was altered accordingly.

I. M. de V., Chief Engineer.

	1902.	1903.
EXPENDITURES (WATER REVENUE BUDGET).		
Chief Engineer's Bureau—		
Salaries and wages	$466,857 22	$464,839 94
Materials and supplies	355,737 12	386,478 01
	$822,594 34	$851,317 95
Repairs to Distribution and Complaints—		
Salaries and wages	$183,904 88	$207,392 37
Materials and supplies	16,290 73	18,307 33
	$200,195 61	$225,699 70
EXPENDITURES (TAX LEVY BUDGET).		
Salaries—		
Office of Chief Engineer	$6,133 32	$1,850 00
Laboratory	5,640 79	7,339 12
	$11,774 11	$9,189 12
Supplies and contingencies	$770 15	$526 18
Rental of fire hydrants	25,000 00	25,000 00
	$25,770 15	$25,526 18
Total expenditures	$1,060,334 21	$1,111,732 95

The Budget prepared by this Bureau for expenditures from January 1, 1903, to December 31, 1903, has been found ample to provide for the requirements, and to leave a material surplus both in the accounts for salaries and for supplies. This result has been due in a great measure to the large gravity supply utilized this year, which has rendered unnecessary to put into service the Driven Well Stations east of Millburn, and has also enabled us to diminish the pumping at many of the old stations, thus economizing both in men, coal, and supplies.

The amounts included in Tax Levy, chargeable to water supply, but not to the engineering work, and therefore omitted above, amounted in 1902 to $79,232.62, and in 1903 to $79,469.62. The above figures show that the receipts for metered water are about 28 per cent. of the total receipts for both metered and unmetered water.

The following are the expenditures provided from

BOND ACCOUNTS.

	1902.	1903.
Brooklyn Water Construction	$17,710 67	$19,962 21
Water Construction—Brooklyn	407,534 29	117,266 48
Water Main Fund	76,885 20	67,110 89
Water Fund	.....	324,948 81
Atlantic Avenue Improvement Fund	.....	25,521 30
Water Meter Fund	.....	151 08
Total Bond Accounts	$502,130 16	$550,960 77

Water Consumption—U. S. Gallons.

	1902.	1903.
Ridgewood Supply—		
Average Daily Consumption—		
Ridgewood low service	83,206,213	87,953,474
Mt. Prospect low service	5,800,032	5,590,049
Mt. Prospect high service	3,248,781	3,232,238
Total	92,255,026	96,775,761
Maximum daily consumption, winter months	101,396,650 (Feb. 10)	111,738,200 (Dec. 28)
Maximum daily consumption, summer months	101,178,400 (June 3)	102,492,150 (July 22)
Maximum average daily consumption for one month	95,333,109 (February)	100,172,740 (December)
Maximum daily consumption for year	101,396,650 (Feb. 10)	111,738,200 (Dec. 28)
Gravesend Supply—		
Average daily consumption	2,875,002	2,813,166
Maximum daily consumption, winter months	3,117,400 (Feb. 20)	3,106,500 (Jan. 25)
Maximum daily consumption, summer months	3,346,300 (June 24)	3,509,800 (July 11)
Maximum average daily consumption for one month	3,132,245 (July)	3,328,077 (July)
Maximum daily consumption for year	3,477,100 (Sept. 5)	3,509,800 (July 11)
New Utrecht Supply—		
Average daily consumption	1,467,536	1,363,693
Maximum daily consumption	1,964,400 (Jan. 15)	2,006,400 (Dec. 19)
Maximum daily consumption, summer months	1,586,000 (June 30)	2,150,000 (Aug. 22)
Maximum average daily consumption for one month	1,547,161 (January)	1,895,630 (September)
Maximum daily consumption for year	1,996,600 (May 17)	2,150,000 (Aug. 22)
New Lots Supply—		
Average daily consumption	3,707,921	3,794,827
Maximum daily consumption, winter months	4,919,500 (Dec. 8)	5,150,400 (Jan. 13)
Maximum daily consumption, summer months	3,920,400 (July 22)	4,265,000 (July 12)
Maximum average daily consumption for one month	4,446,487 (December)	4,425,429 (January)
Maximum daily consumption for year	4,919,500 (Dec. 8)	5,603,300 (May 19)

Summary of Ridgewood, Gravesend, New Utrecht and New Lots Supplies.

	1902.	1903.
Average daily consumption	100,305,485	104,747,447
Maximum daily consumption, winter months	109,358,350 (Feb. 16)	120,796,400 (Dec. 28)
Maximum daily consumption, summer months	109,585,100 (June 3)	109,767,600 (July 10)
Maximum average daily consumption for one month	103,879,545 (February)	108,589,023 (February)
Maximum daily consumption for year	109,585,100 (June 3)	120,796,400 (Dec. 28)
Population dependent upon the systems	1,209,400	1,248,300
Average consumption per head per day	82.9	83.9

In the above tables, and in the statements hereinafter to be made on the condition of the supply, the item of "Consumption" includes not only the actual amount of water used by consumers, but also waste and any errors of measurement.

Storage.

Reservoir.	January 1, 1903. Depth.	January 1, 1903. Contents.	January 1, 1904. Depth.	January 1, 1904. Contents.
Ridgewood Basin No. 1	14.33	49,513,000	16.71	58,333,200
Ridgewood Basin No. 2	14.33	57,573,100	16.98	69,005,200
Ridgewood Basin No. 3	13.36	97,593,500	15.51	114,132,300
Mount Prospect	21.45	20,815,400	21.41	20,769,800
New Lots	9.50	2,172,500	12.70	3,259,100
Total (City)		227,667,500		265,499,600
Hempstead	16.20	633,432,000	17.79	749,335,000
Total Storage		861,099,500		1,014,834,600

Rainfall.

Year	Brooklyn.	Hempstead.
1899	42.11	43.60
1900	43.11	41.43
1901	47.98	49.92
1902	48.47	51.98
1903	52.49	52.14

The total rainfall for 1903 was 52.14 inches, or about 9 inches above the annual average for the last seventy years. With the exception of the year 1900, when it was two inches below the annual average, the rainfall during the last seven years has been above the average. This is a longer period of rainfall above the average than has been observed since 1834, and, as our records show that a period of high rainfall is uniformly followed by one of low rainfall, it seems probable that in the coming and succeeding years the rainfall will be below the average. The last period of high rainfall extended from 1886 to 1890, both inclusive, and was then followed by six years during which the rainfall averaged 5.3 inches below normal. In considering the condition of the supply, these facts must therefore be borne in mind. The distribution of the rainfall during the year was very uneven, there being a long period of drought from April 15 to June 7, which was preceded and followed by heavy rainfalls. We have also had a number of heavy storms during the year, of which the heaviest one occurred on October 8 and 9, when the precipitation as measured at the Municipal Building was 10.31 inches, and at the Hempstead Reservoir 4.33 inches. This rainfall diminished rapidly eastward from the limits of Greater New York.

General Condition of the Supply.

The average daily increase in consumption over 1902 was 4,441,962 gallons, the average daily changes at the various systems being as follows:

	Increase. Gallons.	Decrease. Gallons.
At Ridgewood	4,520,735	.....
At New Lots	86,902	.....
At Gravesend	.....	61,836
At New Utrecht	.....	103,843
Total	4,607,641	165,679
Net increase		4,441,962
		4,607,641

The New Utrecht Station was shut down from June 10 to August 4, while the wells were being pulled, cleaned and redriven. Through the numerous connections now existing between the Gravesend, New Utrecht and Ridgewood systems, we are able to reduce the pumping at Gravesend and New Utrecht without restricting the supply to consumers. Thus, in the summer months, when the consumption at Coney Island was high and New Utrecht Station was for a time shut down, Ridgewood water was supplied. This caused some complaint from residents owing to the fact that while the Ridgewood water is ordinarily clear, it is not as colorless as the driven-well water. The average daily consumption per capita in 1903 was 83.9 gallons, or one gallon more than in 1902, thus showing only a slight increase in consumption over the increase in population. There were few days of extreme high summer temperature, and this resulted in a consumption below the normal. The maximum daily consumption was reached on December 28, and amounted to 120,796,400 gallons.

The heavy rainfall, although unevenly distributed, so increased the gravity supply that it was unnecessary, even in the long spring drought, to operate the driven well stations east of Millburn, and pumping at some of the stations west of Millburn was reduced. Since both the surface and underground supplies on Long Island depend on the underground flow, they are only slightly affected by drought when the latter has been preceded by heavy rainfall.

The completion, in the latter part of 1902, of the 48-inch additional pipe conduit from Millburn to Spring creek, enabled us to utilize a much larger portion of the gravity supply east of Millburn and to reduce the pumping as already stated. The driven well stations east of Millburn were only operated for experimental purposes, i. e., the Wantagh Station on August 21 and 22, and the Agawam Station on

August 19 and 20, and from August 31 to September 14, both days inclusive.
The waste from the supply ponds on the new watershed was as follows:

	Millburn. U. S. Gals.	East Meadow. U. S. Gals.	Newbridge. U. S. Gals.
January	.....	327,565,800	19,744,000
February	5,667,700	137,973,800	10,001,200
March	157,113,100	272,915,000	63,987,200
April	283,001,500	482,696,000	73,750,400
May	22,834,800	124,241,000	4,872,400
June	6,576,800	179,013,800	12,734,800
July	1,220,500	25,713,400	.....
August	6,308,700	67,976,000	8,676,400
September	.....	.....	1,061,800
October	14,047,500	16,687,500	.....
November	1,251,800	2,085,900	122,100
December	732,500	7,248,000	.....
Total	498,754,900	1,680,080,200	194,950,300

	Wantagh. U. S. Gals.	Massapequa. U. S. Gals.	Total. U. S. Gals.
January	126,829,000	24,933,700	499,072,500
February	103,309,400	45,041,400	337,957,500
March	397,729,800	210,113,100	1,101,858,200
April	255,242,000	142,957,700	1,237,647,600
May	68,253,400	2,518,000	222,719,600
June	46,973,800	61,416,000	306,715,200
July	1,061,800	3,170,200	31,165,900
August	48,233,800	32,926,000	164,120,900
September	.....	.....	1,061,800
October	500,000	10,951,200	42,186,200
November	32,765,200	292,300	36,517,300
December	.....	.....	7,980,500
Total	1,080,898,200	534,319,600	3,989,003,200

Total for the five ponds, 3,989,003,200 U. S. gallons.

This is an average waste of about 11,000,000 gallons per day. While a portion of this waste must always take place during freshets, the increased pumping capacity provided for the Millburn Station under existing contracts will enable the Department to prevent a large portion of that waste.

In my report for last year I called attention to the necessity of increased conduit capacity, estimating the present safe conduit capacity at about 100,000,000 gallons per day. Our average daily supply from the Ridgewood system during the coming year will probably be equal to or slightly above this safe capacity. Plans should be prepared and an appropriation made for an additional conduit between Millburn and Ridgewood, and Millburn and Massapequa, unless there be a change in the general plan for the development of the watershed. This will be referred to hereafter more in detail.

Table No. 11 shows the results of the chemical and microscopical analyses of the water. It will be seen that the supply was low in chlorine during the year. For the past six years the average amount of chlorine, in parts per million, was as follows:

In 1898	13.1
In 1899	17.1
In 1900	17.6
In 1901	20.2
In 1902	20.2
In 1903	10.3

Very little difficulty has been experienced from micro-organisms and none of the Ridgewood basins had to be shut off during the year from this cause. The Mount Prospect basin, however, had to be shut off from April 29 to June 2, and from August 7 to date.

During the last year work has been commenced on three contracts, which will increase the supply and to which more detailed reference will be made hereafter, i. e.: For an infiltration gallery at Wantagh, for slow sand filter beds at Forest Stream Station, and for slow sand filter beds below the Hempstead Storage Reservoir.

New shallow wells were driven by our own men at Oconee and the daily supply of this station was increased somewhat over 1,200,000 gallons. It was expected to do similar work at the Shetucket Station, but a clause in the deed for the land prohibits the driving of shallow wells, so that at present the station is only operated for eight hours and at low speed, in order to prevent the infiltration of salt water. Three deep wells have been sunk below the clay bed at the New Lots Station, where indications for a permanent increased supply are favorable. A test of these wells will soon be made, and if the results warrant it they will be permanently connected with the pumping plant.

The completion of the Baisley's and Springfield filter plants, which have been reconstructed during the year, will add about 7,500,000 gallons daily to the supply. These plants are now under test, and the results so far obtained indicate that they will ultimately comply with the contract requirements.

Contract forms, specifications and detailed plans are nearly complete for infiltration galleries at Watt's pond and Massapequa. Further reference will be made to the ultimate development of the watershed by the construction of infiltration galleries and possible utilization of the underground supply within the Borough limits.

Extension and Improvement of Distribution.

Appropriations and Balances—The following appropriations have been obtained during the year:

February 20	$950,000 00
July 15	650,000 00
Total	$1,600,000 00

Under the decision of the Corporation Counsel, a balance of about $195,000 from an appropriation made in 1901 was made available. These appropriations and balance, as well as the remaining balances from other appropriations available on January 1, 1903, will be all required to pay for the work under contracts already awarded or ready to be let, and for the expense of laying the pipes for the first six months of 1904.

The work under the contract for the extension of distribution, awarded on April 7, 1902, to John Hann, and assigned by the latter to Isaac Harris, was completed on June 30.

Two contracts for the extension of distribution have been awarded, and work on the first of these, which was dated February 18, was begun by the contractor, Isaac Harris, on April 25. The contractor has laid the mains on eighty-three different streets and avenues, covering a distance of

486 feet 20-inch pipe.
14,310 feet 12-inch pipe.
41,420 feet 8-inch pipe.
30,743 feet 6-inch pipe.

Contract forms and specifications were prepared for laying water mains on seventy-five streets and avenues, aggregating

6,500 feet 20-inch pipe,
1,500 feet 16-inch pipe,
9,350 feet 12-inch pipe,
36,800 feet 8-inch pipe,
28,200 feet 6-inch pipe,

—which included all streets petitioned for and reported on favorably previous to June 4, 1903.

During the year petitions for 206 different streets and avenues were received and reported on, of which 138 were reported on favorably, covering a distance of

8,060 feet 20-inch pipe.
4,070 feet 16-inch pipe.
42,443 feet 12-inch pipe.
49,815 feet 8-inch pipe.
76,557 feet 6-inch pipe.
Total, 180,945 feet.

Water Mains Laid, Stop Cocks and Hydrants Set.

Water Mains Laid.	20-inch.	12-inch.	8-inch.	6-inch.	Total.
Linear feet	486	21,685	60,179	40,313	122,663
Sop cocks set	1	43	157	136	337
Fire hydrants set (with 1,940 feet of 6-inch branches)					338

General Contract Forms—Early in the year I recommended a change in the cumbersome method then employed for contracting for laying water mains. Under that plan, after a property owner petitioned for a water main in the street, a report was made by this Bureau, and if the report was favorable it was filed until such time as sufficient reports had accumulated to warrant the drawing and printing of a contract for furnishing, delivering and laying the pipe, gates, hydrants, etc. After this contract was awarded, work could be commenced as soon as the necessary materials could be obtained from the foundries. The time elapsed from the date of the petition to the date of laying water mains in the street would therefore vary from about four months as a minimum to a maximum of from twelve to fifteen months. I recommended that blank contract forms and specifications be printed for furnishing and delivering cast-iron pipe and special castings, furnishing and delivering stop cocks, furnishing and delivering hydrants, and hauling and laying pipe and appurtenances, so that, in cases of emergency, contracts could be readily advertised and awarded. This recommendation having been approved by the Commissioner, we now have the blank forms for the pipe and castings for laying the same and for the stopcocks and hydrants.

A contract has been prepared and forwarded for the pipe and specials necessary to cover the work of the extension for the first part of 1904, and as soon as delivery is commenced contracts will be prepared covering the streets in which the pipe is most urgently needed. Under this system it should be practicable to reduce the time between the date of the request for a water main and the date of laying to a maximum of twelve weeks, and in most cases to eight weeks.

Work has been actively in progress on the 48-inch trunk main and 48-inch force main, which will reduce the comparatively large friction loss in the existing mains from the Ridgewood Reservoir to the smaller distribution mains. These mains will increase the pressure generally throughout the City, although greater relief in this respect will be afforded by the large service mains which are to replace small service mains than will be given by the large trunk mains.

Pressures—The need of a map showing the average pressures in the various sections of the City has been greatly felt in the past, and work has been carried on this year to obtain the necessary data for preparing this map. A party has been employed as continuously as was possible taking the pressures on the hydrants at intervals of about 750 feet. Wherever practicable a continuous recording gauge was set at the beginning of the day in the territory where the pressures were being taken, and in some cases left for the full twenty-four hours. These records gave the hourly fluctuations in pressure in the district. It has also been advisable to have a record of the fluctuations in the pressure during fires. To give this information twenty self-recording water pressure gauges have been purchased and will be set by the Department employees in fire engine houses scattered throughout the borough. These records will be collected each week and will show the reduction in pressure due to fires in the vicinity of the stations. They will also give information as to the daily fluctuation in pressure throughout the borough. A good deal of complaint has been made of lack of pressure in different sections of the City, and for many years special complaints have been received from the Clinton Avenue district, bounded by Waverly avenue, DeKalb avenue, Adelphi street and Fulton street, and from the district between the Navy Yard, Willoughby avenue, Adams street and the river front. The Clinton Avenue district has been relieved by connecting with the 16-inch Mt. Prospect service main at Flatbush avenue and Hanson place and laying a 12-inch main through Hanson place and Greene avenue to Adelphi street. The gates on the boundaries of this district have been closed, thus giving to it full Mt. Prospect Reservoir pressure and increasing the pressure of from an average of about 22 pounds per square inch to about 47 pounds per square inch. The 12-inch main laid on Bridge street from the 48-inch main on Willoughby avenue to the 6-inch main on Sands street has partially relieved the Adams and Willoughby street section, increasing the pressure by about 10 pounds to the square inch. This section will be further relieved by the larger service mains to be laid under the contracts for the removal of old mains. The Mt. Prospect service has also been extended to cover the south side of Atlantic avenue, this being made necessary by the cutting out of cross-connections along the line of the Atlantic avenue tunnel. Several additional blocks have been put on this service also, where the pressures were particularly low. The extension of the Mt. Prospect service has been made possible by a reduction in the consumption, due to a careful supervision and inspection of the boundary gates, through which there had previously been considerable leakage from the Mt. Prospect to the Ridgewood service.

Dead Ends—There are in the Mount Prospect service 189 dead ends, which affect the quality of the water, and have caused much trouble and annoyance by the leakage through the gates just referred to. These dead ends should be connected by laying additional mains on the streets forming the boundaries of the Mount Prospect system, which, at the same time, would greatly increase the efficiency of the service for fire purposes. For this main, about 37,000 feet of pipe (mainly 16 inches in diameter) would be required, and the approximate cost of the work would be $170,000.00. A number of dead ends can be avoided by placing a small section at present supplied from the Mount Prospect Reservoir service on the Mount Prospect Tower service, and this will be done as soon as the Mount Prospect Tower engines have been overhauled. The boundaries of the New Lots system should be made permanent, and additional mains laid along these boundaries to remove the existing dead ends, the total number of which at present is 96. This New Lots system was purchased from the Long Island Water Supply Company, and the mains are inadequate for fire service. The low lying territory should be supplied from the Ridgewood Reservoir and the New Lots Station could be kept for a high service station. There is an area of approximately 800 acres, nearly one-half of which is owned by Cemetery Associations, mainly lying in the Borough of Queens, and at an elevation of 120 feet or more above mean high tide. This territory is the beginning of the so-called backbone of the Island, and runs from Broadway eastward to Forest Park. The collecting of water rates for this territory would have to be in the Borough of Queens, but the supply would logically come from the Mount Prospect high service main. A connection from this main could be carried from Atlantic avenue through the Twenty-sixth Ward, and mains laid in the high section. The elevation of the Mount Prospect Tower overflow is 278 feet above mean high tide, and this service would give adequate pressure for even the highest point in the section referred to. It seems there should be no difficulty in thus providing for the supply of this section, even if it were necessary to place meters and pay the Brooklyn Water Revenue Fund from the General Fund the value of the water used.

Removal and Replacing of Existing Mains—Early in the year careful studies were made to determine the sections where there was more urgent need for remov-

ing the present mains and replacing them with larger ones, or increasing their number. The determination of the streets in which the mains were to be laid, as well as the size of the latter, was based in many instances on the Pitometer observations, which were largely used for that purpose.

Three plans were prepared and designated as Plans A, B, and C, which may thus be briefly described:

Plan C—The work under this plan comprised the dry goods district and the river front, and consisted in removing and replacing mains and increasing the latter, the work being so proportioned as to limit the cost to $200,000, which was the amount of the available appropriation.

Plan B—This plan included Plan C and provided, furthermore, for practically all mains twenty inches or more in diameter which would be required in the older section of the City. The cost of Plan B (including the work already detailed under Plan C) is about $690,000, so that the difference between Plan B and Plan C is about $490,000.

Plan A—This comprised Plans B and C, and showed in addition the mains smaller than twenty inches which should be provided as soon as the appropriations could be obtained. Under this plan, which comprised practically all the districts in the older section of this borough (excepting the outlying districts), in regard to which complaints had been made by the Board of Underwriters or the Fire Department of inadequate pressure or supply, the whole area was divided in approximately rectangular sections and the mains so laid that there would be, as far as practicable, no greater distance than two long blocks, or say 1,500 feet between mains twelve inches or more in diameter, and the latter would be connected to larger mains at intervals of about 2,000 feet. The work of removal and replacing of the smaller tuberculated pipe within these primary rectangular sections will be taken up as required after the completion of Plan A.

The work under Plans B and C has already been disposed of, contracts having been awarded for a portion of the same and bids received for the remainder. It is to be hoped that an appropriation of no less than $500,000 may be obtained to carry out Plan A. Upon the completion of the latter, the work of removing and replacing the remaining uncoated tuberculated pipe, laid previous to 1860, should be taken up. The recent disastrous fires must have brought to the minds of our citizens the fact, for several years known and reported by this Bureau, that there was danger in delaying the work of replacing our tuberculated and smaller mains with new and larger ones.

In addition to the above plans we prepared plans for two large trunk mains, i. e.:

First—A 48-inch trunk main from the Ridgewood pumping station to Mount Prospect, which would serve the double purpose of relieving the present Atlantic avenue main and enabling us, by utilizing it as a force main, to concentrate the high service at Ridgewood and suppress the Mount Prospect Station. The great economy and advantages of this plan were fully detailed in the last annual report.

Second—A 48-inch trunk main from the Ridgewood Reservoir down Myrtle avenue to Broadway and Park avenue, with 30-inch branches down Park avenue and Humboldt street. This trunk main was intended to relieve old mains, which our measurements showed were not large enough to provide adequate supply or pressure, and also to increase the efficiency of the fire service along the river front.

Available Fire Streams—While planning the changes to be made in the distribution system and removal and substitution of and increase in the number or diameter of existing mains, careful computations were made, on a conservative basis, of the number of fire streams which could be supplied on the completion of the system. Some of the results obtained were detailed in the discussion of the remodelling of the dry goods district. Additional observations along the river front district showed a number of fire streams available, from 60 to 84.

This is a great improvement over existing conditions, and the efficiency of the system will be still further increased when the removal and replacing of the smaller tuberculated pipe is completed. The effect of this ultimate change was not taken into account in making the computations.

Under the two contracts for Plans B and C, the following pipes are to be removed and replaced:

Size of Main.	Length To be Removed.	Length To be Laid.
	Feet.	Feet.
6-inch	60,560	.....
8-inch	42,800	4,900
12-inch	13,000	9,200
20-inch	.....	88,200
24-inch	.....	22,100
30-inch	.....	6,450

Fire Main and Salt Water Service—Bids have been received on a contract to lay a 16-inch fire main from the Mount Prospect service to the river front, going through the dry goods district and along the manufacturing district on the river front, from Gold street to Fulton street. A connection at Fulton street will permit of the extension of this service along Furman street to Joralemon street. This main will greatly increase the supply for fire service in the district surrounding the Borough Hall, where very large office buildings have been constructed. The recent fire which destroyed the Academy of Music and the adjoining building simply emphasized the inadequacy of the existing mains, and showed the very poor fire service in a section of the City where the difficulties of fighting fire would be very great. The completion of this fire main, together with additions which can be contracted for in the early part of the year, will give ample protection for this section.

At the suggestion of the Commissioner, who expressed to me a desire to have this main adapted as far as possible to salt water service in case of necessity, it has been so designed. The thickness of the pipe and test pressure prescribed in the contract for laying the same, will allow its use as a fire main under high pressure, and, after consultation with the Fire Department, provision has been made for a connection for that purpose at Main and Water streets. In case of an emergency, therefore, by shutting off the gates at Pierrepont street, salt water under high pressure can be pumped into this main for fire purposes, either from the fire-boats or from special engines at fire stations to be constructed, if this be deemed advisable hereafter.

Additional Hydrants—Previous to the last few years, neither cross-connections nor hydrant connections to mains 20 inches and larger in diameter, had been made. By tapping in hydrant connections to the existing 20-inch and 30-inch mains in the City, it will be possible to add about 750 double-nozzle fire hydrants, each hydrant capable of supplying three fire engines, at an approximate cost of $90,000. The 36-inch main in front of the Borough Hall could be tapped, and thirty or more fire engine connections provided in manholes just below the sidewalk. A plan, together with a contract covering the sleeves and gates required for making hydrant connections and cross-connections for this work is under preparation. The work of making connections and placing the hydrants should be done by the Department employees, special gangs being formed for this purpose.

Dry Goods District—Throughout the dry goods district, where possible losses by fire would be the greatest, provision has been made for the complete removal of the old pipe and the increase in number and enlargement of the mains. In this district it would be possible to concentrate on the block bounded by Fulton street, Hoyt street, Livingston street and Gallatin place, 100 fire streams of 250 gallons per minute, without having a greater distance than 600 feet from the hydrant to the fire. This would be in excess of the total number of engines which could be utilized for any fire.

Electrolysis of Water Pipes.

I have in past reports called attention to the importance of devising the best means to avoid damage to our pipes from electrolysis and determining the responsibility for existing conditions, and suggested a thorough examination of the question by special experts. I understand that electrical surveys along the lines of the water pipe to be removed are now in progress. The action of electrolysis on our pipe at various points has been clearly shown by old pipes taken up, and the removal of the existing mains will afford an excellent opportunity for a determination of the damage done to our mains by this action. If the condition of the pipes removed shows serious and general damage to the water mains from electrolysis, it will be necessary to take steps to correct the evil, as well as to determine the liabilities incurred.

Pumping Stations.

Mount Prospect, Gravesend and New Utrecht—Although the area of the district supplied from the Mount Prospect Reservoir has been increased, a reduction has been effected in the consumption from both the high and low Mount Prospect services by the stoppage of leakage through the boundary gates. The measurements made of the flow of the new Clinton avenue district supplied by the Mount Prospect Reservoir showed an average daily consumption of 320,000 gallons. The leakage through these boundary gates is a constant source of trouble and investigations with pitometer are still continued to exactly locate and prevent it. It is sometimes due to carelessness, and others to accidents, but also, I fear, not seldom, to unauthorized tampering with the gates. The completion of the third boiler at Mount Prospect has given sufficient boiler capacity for this station, but the engines are inadequate both on the high and low service. On the high service there is an area of considerable extent adjoining the Eastern parkway, which should be placed on the tower service, but which has not been thus transferred owing to inadequate pumping capacity. The engines on the low service are uneconomical, but no work is being done at the station, except that necessary to keep it in repair, owing to the expected abandonment of this station. As it will be at least two years before the new engines can be installed at the Ridgewood Station for the Mount Prospect service, it will be necessary to temporarily increase the pumping capacity at the Mount Prospect Station. The necessity of this is very clearly shown by the fact that the large engine, or Engine No. 1, for the low service has since the first of January run for 95 per cent. of the full time, and the only engine capable of supplying the tower district, or Engine No. 5, has run 99 3-10 per cent. of the full time. The most economical form of installation for a temporary engine at this station will probably be a centrifugal pump with a steam turbine and designed so as to pump either into the tower or reservoir. A pump of this type, having a capacity of 5,000,000 gallons per day, would add sufficiently to the pumping capacity to insure against interruption to either the high or low district. This engine could be purchased from our Water Revenue Account, as the cost would be comparatively small.

The conditions at the New Utrecht and Gravesend stations are extremely unsatisfactory, as the boilers are worn out and there is only one engine, viz., the Deane engine, at Gravesend, which can give satisfactory service. Since January 1, 1903, this engine has been run for 99.4 per cent. of the full time, and it cannot be expected to continue at this rate. No work has been done towards the renewal of the pumping plant at these stations, as it is hoped to have the new Gravesend Station in operation by the end of next year. The economy resulting from the consolidation of these two stations has been discussed in detail in previous reports. The wells at the New Utrecht Station gave out in the spring, and the station was shut down from June 10 to August 4, during which time one hundred and sixteen 2-inch wells were pulled up and redriven with new single gauze strainers and points.

Ridgewood—At the Ridgewood Station all repairs have been made which were necessary to keep the engines in good condition. On the north side it was found that the valve plate of the lower pump on the No. 2 side was cracked, probably due to shrinkage. This crack has been repaired by bolting heavy brass plates to the casting. The engine has worked well since these repairs were made. A contract has been made for retubing eight of the Morris boilers on the north side, and repairs have been made as required in the other batteries of boilers. A contract was also prepared for the erection of a substantial iron fence around the South Side Station and bids for the same were received on November 25, the lowest bidders being John Fox & Co., $6,125, and Eagle Iron Works, $6,125. The contract has not yet been awarded. An attempt was made to sell the scrap iron which has accumulated around this station, but no bid was received, owing to the high price set as the lowest at which bids would be entertained. These unsightly heaps of old iron should be removed as soon as possible.

New Lots—A defective water valve in one of the engines caused trouble in keeping up the supply in May. With that exception, no difficulty has been experienced. The plant is in fair condition, but should be remodeled, as detailed later.

Line Stations—The Line Stations have been run intermittently owing to the large amount of surface supply, due to the heavy rainfall.

The Shetucket Station has been run very slowly on account of the quality of the water, and at Oconee the new shallow wells have increased the capacity of the station from about 1,800,000 to about 3,000,000 gallons daily.

At the other stations the usual repair work has been done, except at Millburn, where contracts for installing new engines and boilers are being carried out, as detailed under "Contracts."

Coal.

The strike in the anthracite coal region last year has increased the cost of coal to the City in about the same proportion as to private consumers. The contract price for anthracite coal furnished to the Department at the Ridgewood station in 1902 was $4.71 1-3, the contract made for the first four months of 1903, $5.54, and the contract from May 1, 1903, to April 30, 1904, $5.35. The corresponding prices for semi-bituminous coal were, for 1902, $3.36; for 1903, $4.15, and for 1903-1904, $3.87.

As all the Brooklyn supply is pumped at least once, and in some cases three or four times, this increased cost of coal has added to the cost of maintaining the supply, although not to the same extent as it would had not the unusually large gravity supply reduced the pumping necessary on the old and new watersheds. It was considered that lower prices could be obtained for the coal delivered if the unloading and hauling and the furnishing of the coal were contracted for separately. A contract was therefore made for unloading, hauling and storing the coal, and this contract was divided into three sections, i. e.: Section 1 included the Mt. Prospect, New Utrecht, New Lots and Spring Creek stations, these stations being within the borough limits. Section 2 included Shetucket, Oconee, Baiseley's, Jameco and Springfield stations, these stations being within easy reach of a contractor, with headquarters at Jameco. Section 3 included the nine stations east of Springfield, with the exception of Millburn, where the unloading was done by the Department employees. The lowest bids for each section were received from the same contractor, and, while some difficulty has been experienced, the work has been done at a low rate and fairly satisfactorily.

My recommendation in previous reports to change the date of letting the contracts for furnishing coal from December to April was acted upon. Better prices can be obtained in spring than in winter months, and the change is also desirable because in spring the difficulties in securing prompt deliveries are less than in the middle of the winter, and before the advent of the latter the contractor has sufficient time to familiarize himself with the details of the work.

By relieving the coal contractors, as recommended by this Bureau, from the work of unloading, hauling and storing the coal, increased competition was secured and the bids received in the spring were exceedingly close, as shown by the following table:

Section I., Semi-Bituminous Coal.

Name of Bidder.	Price Bid.
Morrisdale Coal Company	$88,868 50
Weaver Coal and Coke Company	89,565 00
George D. Harris & Co	89,832 00
A. M. Wittenberg	91,200 00
Rudolph Reimer	91,352 50
Peter Clark	95,100 00

Section II., Anthracite Coal.

Name of Bidder.	Price Bid.
Rudolph Reimer	$231,255 00
Weaver Coal and Coke Company	249,005 00
Simon Nager, Jr	255,645 00

Coal Saving Devices—On August 25 and August 27 tests were made of coal saving devices furnished under requisition by the Coal Saving and Heating Company on Boiler No. 1 at the New Lots station. The company guaranteed a minimum economy of consumption of 10 per cent., to be determined by two evaporative tests to be taken by the engineering force of the station, under the direction of the Engineer in charge of the same, or such other Engineer as might be detailed for that purpose, and agreed to remove the apparatus and receive no compensation in case this result was not secured. The results of the test, as reported by Mr. Torrance, the Engineer in charge at Ridgewood, showed that the guaranteed economy had been obtained and exceeded. The cost of the apparatus was $250. Additional tests will be made of this apparatus under varying conditions.

A requisition was also made for a Foster superheater and furnace, at a cost of $475, which is in process of erection. The contractors guarantee to raise the temperature of the maximum amount of water that could be evaporated by the boiler while in the service of the station to a temperature of 448 degrees Fahrenheit, corresponding to a superheat of 125 degrees; also to show a minimum economy in the consumption of coal of 8 per cent. without injury to the plant, these results to be ascertained by one evaporative test, to be made by the engineering force of the station, under the direction of the Engineer in charge of the same, or such other Engineer as might be detailed for that purpose. Should the results of the test fail to show the above economy, or any injury to the plant, the superheater, furnace and all connections are to be immediately removed by the contractor at his own expense, and the Department shall make no payment for furnishing, installing or removing said superheater and furnace, as above stated.

Forest Park Reservoir.

Detailed plans and specifications were prepared two years ago for constructing the Forest Park Reservoir, which was designed as an additional safeguard from interruption of the supply by an accident to the conduit or Ridgewood Pumping Station. No appropriation has been made as yet for this work.

Driven Wells.

Mention has already been made of the shallow wells driven at the Oconee Station and the deep wells driven at the New Lots Station. Four well gangs have been employed during the year in driving the new wells and in cleaning the old wells. Where a driven well station is run intermittently the wells clog much more rapidly than where continuous pumping is carried on. The following is a summary of the work done in cleaning and repairing wells:

New Utrecht Station—One hundred and twenty 2-inch wells pulled, cleaned and redriven with new single-gauze strainers.

New Lots Station—Three 8-inch deep-test wells driven to depths of 162 feet, 136 feet and 136 feet.

Shetucket Station—One 8-inch well partially pulled and left at a depth of 92 feet.

Oconee Station—Forty-two 2-inch wells driven to depths of 62 feet to 47 feet, and three 2-inch strainers; two 8-inch deep wells pumped out.

Baiseley's Station—Seventy-three 2-inch wells pulled, cleaned and redriven with new single gauze strainer points to depths of 35 feet to 38 feet.

Jameco Station—One hundred and thirty-five 2-inch wells pulled, cleaned and redriven with new single gauze strainer points, redriven to depths of from 29 feet to 33 feet; ten 8-inch deep wells cleaned, and one 5-inch suction with 5-inch single-gauze strainer placed in 8-inch cases.

Springfield Station—Work has just been commenced on cleaning the 8-inch wells at this station.

Forest Stream Station—One hundred and ten 2-inch wells pulled, cleaned and redriven with new single and double gauze strainers and points. Wells vary in depth from 24 to 40 feet. Four service wells driven at this station for the engine room and cottages.

Clear Stream Station—Fourteen 2-inch wells for test purposes. Ten 2-inch wells have been washed and cleaned.

Watts Pond Station—Seven 6-inch wells cleaned. Four 2-inch test wells have been driven for sand samples.

Test Wells Between Watts Pond and Rosedale—Twelve 2-inch test wells driven between Watts Creek crossing and Rosedale railroad station.

Test Wells Between Valley Stream and Lynbrook—Twenty-three 2-inch test wells driven between Valley Stream and Lynbrook, eleven of them being for sand samples.

Test Wells, Wantagh to Massapequa—Sixty-seven 2-inch test wells driven between Wantagh and Massapequa.

Test Wells at Massapequa—Fifty-four 2-inch test wells were driven east of Massapequa Station.

Test Wells at Bellmore—Two 2-inch wells driven 100 feet south of the railroad track and 300 feet south of the railroad track, west of Bellmore road. These wells were driven for the purpose of sand samples.

In preparing the defense in damage suits brought against the City for alleged diversion of water, the lack of definite and detailed information as to the elevation of the underground water before the establishment of the driven-well stations had been seriously felt. To guard therefore against this difficulty in the future, and to obtain reliable data as to the normal fluctuations of the underground water level, about two hundred test wells have been driven throughout the watersheds of the Watts Pond, Wantagh and Massapequa infiltration galleries The elevation of the water in these new wells and in the previously existing ones is taken at regular intervals of five days, one of our employees being permanently assigned to this work. It is unfortunate, from the City's standpoint, that this record should have been necessarily commenced this year, when, owing to the abnormal rainfall, the level of the ground water is much higher than the average, since under these conditions it might hereafter be charged that the total lowering of the ground water level then found would be entirely due to the pumping.

Ponds, Conduits and Reservoirs.

The usual work of patrolling and cleaning the streams on the watershed has been carried on. In the spring, work was commenced on the race track at Elmont, which lies on the upper part of the watershed drained by the Simonson's supply pond feeder. The large gangs employed on this work made it necessary to have a very careful supervision of the water, and a Watchman has been stationed at the work to see that sanitary regulations are carried out. The use of the water from this pond has been discontinued, except at such times when examinations showed it to be safe. This pond supply was cut off as follows:

From May 22 to June 16.
From June 30 to July 25.
From August 6 to August 25.
From October 9 to October 21.

The following schedule gives a summary of the work of cleaning closets and cesspools on the watershed, together with the total cost:

Near Foster's Meadow stream	1,691
Near Springfield stream	2,157
Near Valley Stream	653
Near Pines stream	479
Near Schodack brook	372
Near Hempstead	9,559
Near Milburn stream	291
Near East Meadow stream	416
Near Wantagh stream	653
Along Conduit line	2,761

The total cost of this work during the year was $3,898.73.

Millburn Reservoir—In compliance with previous directions complete plans, specifications and form of contract for the repair of the Millburn Reservoir were prepared and submitted in the latter part of last year. No action has been taken on the same.

Conduit Inspection—The completion of the new 48-inch pipe conduit enabled us to lower the water in the main brick conduit, from Smith's pond to Baiseley's, and a careful inspection of the same was made, by my direction, both by Mr. Skilton, the Assistant Engineer on Ponds and Conduits, with regards to the condition of the masonry, etc., and by Mr. Whipple, the Biologist at the Mt. Prospect laboratory, with regards to the nature of the deposits on the wall and the nature of the organisms in the collected samples of water, growths and results of microscopical examination of samples collected, etc.

The detailed report of Mr. Skilton shows that the general condition of the masonry was practically as good as when the conduit was built, only a few and comparatively unimportant cracks and leaks having been observed. Repairs were made as required and the sides and invert were scraped and rubbish and larger sand bars removed.

The examination of the deposits by Mr. Whipple showed that the walls were covered with slime to a depth of about one-eighth inch from Smith's Pond Gate House to Valley Stream, but that there were no sponge, few bryozoa and a few snails. The bottom deposit was about two or three inches of mud in the centre and from one-half inch to one inch on the side. It had more or less sand, but no bad odor. The stains on the brick work showed that at times the water had been within 5¼ inches from the crown. This confirms our previous measurements and reports made on the abnormal depth of water we were obliged to carry through the conduit before the completion of the additional pipe conduit.

At Smith's Pond Gate House the woodwork was covered with a thin growth of plumatella, and there was also a small growth along the sides of the conduit for a distance of about two feet from the bottom; also a thick growth on the bottom itself. The first indications of sponge were found about 400 feet below a sand bar west of the discharge pipe from Smith's pond. Below the first manhole the mud at the bottom was about 1½ inches thick in the middle and had a width of about four feet. There was less sand in the sediment than above and 500 feet below the first manhole sponge became more abundant, especially at the bottom, and plumatella also were in thick masses, sometimes two or three inches long. Many fresh water shrimps, amounting perhaps to about 500 per running foot of conduit, were found here in the water, and just before the second manhole was reached there was a decided increase in the amount of sponge. From several cross sections made there it was estimated that on an average there were about ten lumps of sponge, projecting three inches into the conduit per running foot, with many more similar ones from one-quarter to one-half inch in thickness.

Along the second manhole the sponge on the bottom formed an almost continuous layer, with patches extending up the sides about two feet. There was here, however, comparatively little sediment, probably not over one-quarter inch in actual thickness. Comparatively few plumatella were found below the second manhole.

The biological conditions between Manhole No. 5 and Valley Stream did not change materially, and the amount of sponge continually decreased, but was still considerable even at the Valley Stream Gate House. About one dozen eels, varying in length from 6 inches to 2 feet, were observed, and many white perch, besides numerous small snails, clams, etc. The sponge were found to be more abundant at the bottom of the conduit than higher up on the sides. "This was the case wherever there was but little sediment, and served to indicate comparative freedom from turbidity of the water which passed through the conduit. Ordinarily sponge grows more luxuriantly further up on the sides." Mr. Whipple did not observe any sponge higher than 3 feet from the bottom.

"The microscopical examination of the samples collected in the conduit showed the presence of the following organisms:

"Anthophysa, vorticella, anguillula, crenothrix, acineta, rotifer, closterium, spirogyra, surirella, navacula, melosira, fragilaria, tabellaria.

"I expect to be able soon to make the necessary arrangements for the inspection of the remaining conduit section, i. e., from Baiseley's to East New York."

The condition of the conduit lands has been rather detrimental to the property through which it passes, and, with the object of improving the appearance of the line, experiments are about to be made to determine what kind of grass will grow on the sandy surfaces of the slopes. If a grass surface can be secured, and the weeds and bushes are kept mown, a considerable improvement will be effected.

Height of Water at Ridgewood Reservoir and Slope Repairs.

The water in the Ridgewood Reservoir has been kept at a normal elevation during the greater part of the year, but in the latter part of September, Basin No. 3 was lowered as a precaution against any accident while connection was being made to this basin with the new 48-inch pipe line. While the water in the reservoir was low, advantage was taken of the opportunity given to repair the slopes, several holes showing in the lining about midway between the high and low water mark, where the concrete lining joins the stone paving. This work has just been completed and the reservoir level will be raised as rapidly as possible.

Base Line—Difficulty has been experienced in the past with readily obtaining a base line to utilize for surveys relating to the work. To obviate this, a permanent line has been established following the centre line of the conduit from Spring creek gate chamber to Smith's pond. This line has been marked by concrete monuments, with a centre brass point, the top of the monuments being just below the surface of the ground and the location being referenced to manholes, gate houses, etc.

Contracts.

The following summary shows the contracts which have been prepared and forwarded for approval, printing and advertising, and those for which bids have been received, as well as the lowest bidder in each case and the date of signing the contracts, together with a brief description of the contracts on which work has been done during the year:

Contracts Prepared and Forwarded for Approval, Printing and Advertising.

(1) For furnishing, delivering and laying a 36-inch cast iron main, including all the necessary appurtenances, on Atlantic avenue, between Carlton and Flatbush avenues.

(2) For furnishing and delivering controllers for Springfield and Jameco filters.

(3) For furnishing and delivering semi-bituminous and anthracite coal in the following amounts:

Section I—22,800 gross tons of semi-bituminous coal.

Section II—43,700 gross tons of anthracite coal.

(4) For furnishing, delivering and laying a 48-inch cast iron force main, together with all appurtenances complete, from the Ridgewood Pumping Station, along Atlantic avenue, East New York avenue and Eastern parkway to the Mount Prospect High Service Tower.

(5) For furnishing, delivering and laying a 48-inch trunk water main at the Ridgewood Reservoir, in Cypress Hills, Myrtle avenue and Broadway.

(6) For furnishing, delivering and laying water mains and removing existing water mains in Columbia, Furman, Fulton, Water, Gold, Nassau, Nevins, Smith, Bond, Willoughby, Schermerhorn and Livingston streets; in Atlantic, Flushing, Classon and Kent avenues; in Boerum, Grove, Hanover, Elm and Gallatin places, and in Red Hook lane.

(7) For retubing Morris boilers Nos. 1, 2, 3, 5, 6, 7, 8 and 9 at the Ridgewood Engine House.

(8) For furnishing all the necessary materials and constructing two filter beds, with all their appurtenances complete, near the Hempstead Storage Reservoir, Hempstead, L. I.

(9) For furnishing and delivering cast iron pipe and special castings.

(10) For furnishing and delivering stop-cocks.

(11) For furnishing and delivering sleeves and gates for tapping machines.

(12) For furnishing and delivering caulking lead and caulking yarn.

(13) For furnishing all the necessary materials for and constructing two filter beds, with all their appurtenances complete, at the upper pond near the Forest Stream Pumping Station, Rosedale, L. I., including the removal of muck from the bed of the ponds.

(14) For furnishing, delivering and laying trunk water mains in Broadway, Park avenue, Sumner place and Humboldt street.

(15) For furnishing, delivering and laying water mains in Provost, Grove, Etna, Dean, Powell, Warwick, etc.

(16) For remodelling and extending the Wantagh Pumping Station, near Wantagh, L. I., including pumping plant, pump well, infiltration galleries, etc.

(17) For remodelling and extending the Watts Pond Pumping Station, near Valley Stream, L. I., including the pumping plant, pump well, infiltration galleries, etc.

(18) For furnishing, delivering and laying a 16-inch trunk water main in the Borough of Brooklyn.

(19) For furnishing and erecting a wrought iron fence, with gates, at the New Ridgewood Pumping Station.

(20) For furnishing and installing steam engines, generators and wiring at the Jameco and Springfield stations, etc.

(21) For furnishing and delivering cast iron pipe and special castings.

(22) For handling and laying water mains and appurtenances.

(23) For furnishing, delivering and laying water mains and removing existing water mains in Conover, Williams, Imlay, Van Brunt, Harrison, etc.

(24) For unloading, hauling, storing and trimming the coal required for various pumping stations, etc.

(25) For furnishing and delivering cast iron pipe and special castings.

Special castings—

A—525 tons of straight pipe.

B— 12 tons of special castings.

(26) For furnishing and delivering stopcocks for distribution mains.

(27) For furnishing and delivering standard case hydrants.

(28) For furnishing and delivering sulphate of alumina and soda ash.

(29) For furnishing and delivering cast iron pipe and special castings:

A—2,970 tons of straight cast iron pipe.

B—170 tons of cast iron special castings.

Contracts for which bids were received, together with name of lowest bidder and total amount bid on basis of Engineer's estimate of work to be done.

(1) For furnishing, delivering and laying a 36-inch cast iron main, including all the necessary appurtenances, on Atlantic avenue, between Carlton and Flatbush avenues.

John J. Cashman $24,938 50

(2) For furnishing and delivering controllers for Springfield and Jameco filters.

New Jersey Foundry and Machine Company $3,495 00

(3) For furnishing and delivering semi-bituminous and anthracite coal in the following amounts:

Section I—22,800 gross tons of semi-bituminous coal.

Section II—43,700 gross tons of anthracite coal.

Section I—Morrisdale Coal Company $88,868 50

Section II—Rudolph Reimer 231,255 50

(4) For furnishing, delivering and laying a 48-inch cast iron force main, together with all the appurtenances complete, from the Ridgewood Pumping Station, along Atlantic avenue, East New York avenue, and Eastern Parkway to the Mount Prospect High Service Tower.

John J. Cashman $422,247 50

(5) For furnishing, delivering and laying a 48-inch water main at the Ridgewood Reservoir, Cypress Hills, Myrtle avenue and Broadway.

New York Continental Jewell Filtration Company $236,750 00

(6) For remodeling and extending the Wantagh Pumping Station, near Wantagh, L. I., including pumping plant, pump well, etc.

New York Continental Jewell Filtration Company $130,285 00

(7) For furnishing, delivering and laying water mains and removing existing water mains in Columbia, Furman, Fulton, Water, etc.

M. J. Dady $213,626 15

(8) For retubing Morris boilers Nos. 1, 2, 3, 5, 6, 7, 8 and 9 at the Ridgewood Engine House.

Edwin Burhorn $5,498 00

(9) For furnishing all the necessary materials for and constructing two filter beds, with all their appurtenances complete, near Hempstead Storage Reservoir, Hempstead, L. I.

Frederick N. Lewis $9,120 00

(10) For furnishing and delivering cast iron pipe and special castings.

Camden Iron Works $22,628 00

(11) For furnshing and delivering stopcocks.

Kennedy Valve Manufacturing Company $5,060 00

(12) For furnishing and delivering sleeves and gates for tapping machines.

The A. P. Smith Manufacturing Company $5,072 06

(13) For furnishing and delivering caulking lead and caulking yarn.

F. N. DuBois & Co $686 00

(14) For remodeling and extending the Watts Pond Pumping Station, near Valley Stream, L. I.

J. McFerran $125,062 50

(15) For furnishing, delivering and laying water mains in Gravesend, Twenty-third, Twelfth, Bushwick, Fountain, Norwood, Newport, etc., etc.

Isaac Harris $133,934 60

(16) For furnishing and delivering semi-bituminous and anthracite coal in the following amounts—

Section I—Geo. D. Harris & Co $35,690 00

Section II—Peter Clark 79,518 60

(17) For unloading, hauling storing and trimming the coal requred for various pumping stations, etc.

Peter Lynam $13,891 50

(18) For furnishing and delivering single and double nozzle case hydrants.

Camden Iron Works $11,530 00

(19) For furnishing all the necessary materals for and constructing two filter beds, with all their appurtenances complete, at the Upper Pond near the Forest Stream Pumping Station, Rosedale, L. I., including the removal of muck from the bed of the pond.

Isaac Harris $50,000 00

(20) For furnishing and delivering lubricating and illuminating oils and lubricating grease.

William E. Burke $2,977 25

(21) For furnishing, delivering and laying trunk water mains in Broadway, Park avenue, Sumner place and Humboldt street.

M. J. Dady $60,302 50

(22) For furnishing, delivering and laying water mains in Provost, Grove, Etna, Dean, etc.

Isaac Harris $111,816 50

(23) For furnishing, delivering and laying a 16-inch trunk water main in the Borough of Brooklyn.

Isaac Harris $89,885 00

This contract was readvertised and bids received on November 18, the lowest bidder being George W. Pereira, and the amount of his bid was $77,398.00.

(24) For furnishing and erecting a wrought iron fence, with gates, at the New Ridgewood Pumping Station.

John Fox & Co $6,125 00

Eagle Iron Works 6,125 00

(25) For furnishing and delivering cast iron pipe and special casting.

A—525 tons of straight pipe.

B— 12 tons of special castings.

Warren Foundry and Machine Company $13,410 00

(26) For furnishing and delivering steam packing, lamp and abestos wick.

R. W. Geldart $1,568 00

(27) For furnishing and delivering hay, oats, fine feed, corn meal and rock salt.

William Gleichman $678 62

(28) For furnishing, delivering and laying water mains and removing existing water mains in Conover, Williams, Imlay, Van Brunt, Harrison, etc.

M. J. Dady $474,142 50

(29) For furnishing and delivering cast iron pipe and special castings.

A—2,970 tons of straight cast iron pipe.

B—170 tons of cast iron pipe and special castings.

John Fox & Co. $77,552 50

Contracts Nos. 15, 16, 17, 18, 20, 26 and 27 were prepared last year.

Brief Description of Contracts on Which Work Has Been Done During the Year.

Contract for additional 48-inch pipe conduit.

Contractor, William H. Masterson. Dated November 16, 1900. Certification, $870,397.

Work on this contract was completed in December, 1902, and the guarantee period expired on December 10 of this year.

Contract for mechanical filter plants for Baisley's and Springfield streams.

Contractor, J. P. Cranford & Co. Dated March 1, 1901. Certification, $164,250.

The contract test of these filter plants was commenced in 1902, but structural weaknesses developed and the plants did not comply with the contract requirements. The contractor commenced remodeling both plants along the lines recommended by Mr. A. W. Fuller, who gave to the Commissioner an expert report on their construction. The contract test for the Springfield filters was commenced on September 21, 1903, and for the Baisley's filters on November 10, 1903. The results so far indicate that the plants will conform to the contract requirements, and their completion will add about 8,000,000 gallons daily to the supply.

Contract for furnishing two new boilers at Mount Prospect Station.

Contractors, Williams & Gerstle. Dated April 30, 1901. Certification, $18,494.

This work was completed last year, and a final certificate was given on June 30, 1903, at the expiration of the guarantee period.

Contract for furnishing and laying water mains in Atlantic avenue, Belmont avenue, etc.

Contractor, John Hann. Dated April 7, 1902. Certification, $77,016.

The work of laying mains under this contract was completed on June 30, 1903. The final estimate called for a total of $75,082.94. The mains laid under this contract were for extensions in streets where there were no existing mains.

Contract for furnishing steam engines and generators for Millburn and Ridgewood Stations, etc.

Contractor, Frank G. Blanchard. Dated May 13, 1902. Certification, $7,470.

This contract was completed in 1902, and a final certificate given at the end of the guarantee period, on October 10, 1903.

Contract for furnishing Pumping Plant at Millburn Engine House.

Contractor, Henry R. Worthington. Dated September 17, 1902. Certification, $51,000.

This contract calls for the erection of two new 12,500,000-gallon pumping engines, together with the necessary appurtenances. The contractor has erected both engines, one of these engines being placed in the east end and one in the west end of the Millburn Engine House. The east engine was sufficiently completed to be run on August 26, 1903, and the west engine on November 15, 1903. There is still some work to be done before the plant is sufficiently complete for the contract test.

Contract for furnishing two new boilers at the Millburn Station.

Contractor, Edwin Burhorn. Dated September 20, 1902. Certification, $11,400.

This contract calls for two horizontal, return-tubular boilers, one to be erected in the east boiler room and one in the west boiler room at the Millburn Station. These boilers are to be utilized for the new engines called for in the preceding contract. The contractor has completed his work, and the boilers are ready for testing. He has been delayed by the contractor for the engines not furnishing promptly connections called for under the engine contract.

Contract for furnishing one new boiler at the Mount Prospect Station.

Contractor, E. Rutzler. Dated October 17, 1902. Certification, $6,085.

This contract called for one horizontal return tubular boiler erected at the Mount Prospect Engine House. The contractor completed his work in the spring of this year, and the contract test was made on June 16, 1903. The results of the test showed that the boiler more than fulfilled the contract requirements. This contract calls for a guarantee period of one year, which will not expire until June, 1904.

Contract for furnishing and laying water mains in Gravesend avenue, Twenty-third avenue, etc.

Contractor, Isaac Harris. Dated February 18, 1903. Certification, $133,934.60.

This contract was for the extension of mains in the outlying territory, mainly in the Twenty-sixth, Thirtieth and Thirty-first Wards. The contract also provided for 12-inch relief mains on Bridge street, between Willoughby and Sands streets, on Hanson place and Greene avenue, between Flatbush avenue and Adelphi street, and at the New Lots Reservoir a 20-inch connection between the Ridgewood system and the New Lots system.

This contract is now nearly completed, but will probably run over into the spring on account of the necessity of stopping work during the severe winter weather. If the contractor had not been delayed in receiving his special castings he could have completed the work this year.

Contract for furnishing automatic filter controllers at Springfield and Jameco stations.

Contractors, New Jersey Foundry and Machine Company. Dated June 9, 1903. Certification, $3,495.

This contract called for the delivery of five automatic controllers for the filter tanks at Springfield and ten for the Baiseleys tanks. The controllers were delivered in August and they worked satisfactorily. This contract called for a guarantee period of one year, which will expire in August, 1904.

Contract for retubing eight Morris boilers at the Ridgewood Engine House.

Contractor, Edwin Burhorn. Dated June 26, 1903. Certification, $5,498.

This contract calls for new tubes for eight out of the ten boilers erected at the Ridgewood Pumping Station in 1896. The tubes had become badly pitted, and it was necessary to have them replaced. The contractor has experienced difficulty in obtaining the charcoal iron tubes called for, and work has been delayed on this contract.

Contract for furnishing and laying a 48-inch trunk main from Ridgewood Reservoir to Myrtle avenue and Broadway.

Contractors, New York Continental Jewell Filtration Company. Dated June 27, 1903. Certification, $236,750.

This contract provides for an additional trunk main from the reservoir, and its construction will generally increase the pressure in the section of the City lying north of Atlantic avenue. The contractor commenced work at the foundry on July 25 and on the ground on September 14. He has just completed the connection to Ridgewood Reservoir, where the work was necessarily slow on account of the deep trench, and rapid progress should now be made in laying the pipe along Cypress and Myrtle avenues. Up to December 31 there had been laid 6,086 feet of pipe. The maximum amount of work for one day to date has been thirty lengths, laid on November 22.

Contract for remodeling and extending the Wantagh Pumping Station by means of infiltration gallery system.

Contractors, New York Continental Jewell Filtration Company. Dated June 27, 1903. Certification, $130,285.

This contract is the first one made for infiltration galleries, which it is expected will take the place of driven wells as a means of collecting the underground supply.

This contract has been delayed by the inability of the City to furnish the land required and by the negotiations for a permanent engine house and pumps in place of the temporary ones called for in the contract. These negotiations were unsuccessful, as the price asked by the contractors exceeded the allowance that could be made under the terms of the contract. The contractors have now completed 1,096 feet of 36-inch pipe and on November 30 last stopped work, as their line had reached the limit of the land at present owned by the City. It is probable that no further work will be done on this contract until spring.

Contract for furnishing and laying a 36-inch main on Atlantic avenue, between Carlton and Flatbush avenues.

Contractor, J. J. Cashman. Dated July 1, 1903. Certification, $24,938.50.

This contract covers a 36-inch by-pass main to take the place of the 48-inch main on Atlantic avenue, laid in 1867-1868. This was made necessary by the work of constructing the tunnel by the Atlantic Avenue Improvement Commission, and the cost of the work is being borne by that Commission. The contractor commenced work on September 8, 1903, the first pipe being laid on September 15. He has been delayed in completing the contract by the foundries not furnishing the pipe and special castings at the rate called for. The work is now, however, completed, except the conections with the 48-inch main at Carlton avenue and at Flatbush avenue, which will be made as soon as the weather permits.

Contract for furnishing and laying a 48-inch main from the Ridgewood Pumping Station to the Mount Prospect high service tower.

Contractor, J. J. Cashman. Dated July 6, 1903. Certification, $422,247.50.

This contract provides for the force main necessary to abandon Mount Prospect and pump to the high service from the Ridgewood station direct. The main will be utilized as a low service main until the new engines are provided at Ridgewood, connection having been made to the existing Ridgewood mains and to the City distribution mains at Albany avenue, Eastern parkway. The contractor commenced work in the field on September 24, and laid to date 7,819 feet of pipe. The work of

laying the main has been delayed by the necessity of changing the lines originally proposed along Atlantic avenue about 16½ feet north of the south curb line to a line about 5 feet north of said curb line. This change was made necessary on account of the claim by the Long Island Railroad Company that they owned the street within their old right-of-way lines. In that contract it was specified that the pipe should be tested to a pressure of from 100 pounds to 125 pounds per square inch for light and heavy pipe respectively, and the allowable rate of leakage at 125 pounds was to be 2½ gallons per twenty-four hours per lineal foot of main. A test has just been made of the first section, the total length of main tested being 1,066 feet. A cap was placed at one end and a gate used for closing the other end. Under these conditions the amount of water pumped into the main for ten minutes to hold the pressure at 125 pounds was equal to 16.3 gallons, the allowable leakage being 18.5 gallons. tI is probable that a large portion of leakage was in the gate, as it is practically impossible to obtain a water gate that will be absolutely tight when placed in a pipe line.

Contract for constructing two filter beds below Hempstead Storage Reservoir.

Contractor, F. N. Lewis. Dated July 28, 1903. Certification, $9,120.

This contract provided two filter beds for filtering the flow from Horse brook, this brook being the natural feeder of the Hempstead Storage Reservoir. The brook passes through the town of Hempstead, and is polluted by sewage and refuse draining or washing into the brook. In 1897 and 1898 a 36-inch cast iron pipe was laid around the reservoir, and discharging below the Smith's pond, which is the lowest supply pond on this valley. This by-pass carries the flow from the brook, and the only portion which is utilized for the supply is a small amount which is held in a storage basin at the head of the reservoir until it has become purified by sedimentation, this usually taking about a month to six weeks' time. The water is to be taken from this by-pass and discharged onto the filter beds and then flow into the Hempstead supply pond. The beds are constructed of unwashed sand, with the under-drains laid slightly below the normal ground water level, thus doing away with the necessity of any masonry lining. The beds have now been completed and all the work done, and the beds will be put in operation as soon as the weather permits.

Contract for constructing two filter beds near Forest Stream pumping station.

Contractor, Isaac Harris. Dated August 24, 1903. Certification, $50,000.

These filter beds will be used to purify the supply at present taken from the Simonsons pond. This has been made necessary by the dangers from pollution, due to the increase in population on the watershed. The beds are similar in type to the Hempstead beds, except that the sand is washed sand and a layer of gravel underlies the entire bed. One of the existing engines will be utilized to pump the filtered water into the conduit. The contractor has commenced removing muck from the pond located adjoining the site of the filter beds.

Contract for furnishing and laying mains and removing existing mains in Columbia street, Furman street, etc.

Contractor, M. J. Dady. Dated September 18, 1903. Certification, $213,626.15.

This is the first of the contracts providing for the replacing of the small tuberculated mains with larger mains, thus increasing both the pressure and supply for fire and domestic purposes. Under this contract a main 20 to 24 inches in diameter will be laid along the river front from Columbia and Harrison streets to Kent avenue and South First street A 24-inch main will be laid in Gold street, from Water street to Willoughby street, and the dry-goods section, bounded by Flatbush avenue, Atlantic avenue, Boerum place and Fulton street, will be provided with new mains adequate for the severest fire. The contractor has already delivered pipe on the ground, but will probably not commence laying until the end of the winter.

Contract for furnishing and laying mains in Broadway, Park avenue, Sumner place and Humboldt street.

Contractor, M. J. Dady. Dated September 18, 1903. Certification, $60,302.50.

This contract provides for a continuation of the Myrtle avenue trunk main, and, with the cross connections, will greatly relieve the section of the City lying north of Broadway and Flushing avenue. Pipe have been delivered for this work, but the laying of the pipe will probably not be commenced until the early spring.

Contract for furnishing water.

Contractors, Queens County Water Company. Dated August 22, 1903.

This contract provides for the furnishing of a supply of 3,000,000 gallons daily for a period of two years, at a price of $30 per million gallons. The water will be delivered into the conduit at the company's expense, near Valley Stream, Long Island.

Contract for furnishing and laying mains in Provost, Grove street, etc.

Contractor, Isaac Harris. Dated October 21, 1903. Certification, $111,817.

This contract provides for the extensions to the distribution in streets reported on favorably up to June 4, 1903. The contractor has commenced the foundry work, but field work will not be started until early in the spring.

By referring to the list of contracts advertised it will be seen that the foregoing description of work done refers only to contracts covering special work. This brief description will give an idea of the magnitude and diversity of the work at present carried on by this Bureau.

Appropriations for Work and Contracts Certified.

Date of Appropriation.	Work for Which Appropriation Was Made.	Amount of Appropriation.	Amount of Certification of Contract.	Remarks.
Dec. 19, 1902..	For remodeling and consolidating the present Gravesend and New Utrecht Pumping Stations, land required, two high-duty pumping engines, steel stack, foundations, steam fittings, connections, appurtenances, etc., remodeling of engine house and moving dwelling, change in new pipe and changes in old line	$100,000 00	.....	Map of land required submitted.
May 23, 1902.. Amended	For two additional boilers at the Millburn Pumping Station	22,000 00	$11,400 00	
Oct. 29, 1902.. Amended June 5, 1903.	For the construction of filtering plants and appurtenances, and infiltration galleries, including the purchase or purchases of lands therefor for increasing, improving and protecting the water supply of the Borough of Brooklyn	200,000 00	9,120 00	
	For additional driven wells, stations, etc., to enable the City to seek an additional water supply	154,000 00	50,000 00 130,285 00	
	For additional lands, for pipe conduits and stations, to enable the City to seek an additional water supply	25,000 00	.....	Map of land required submitted.
	For test wells to enable the City to seek an additional water supply	5,000 00		
	For new water mains	175,000 00	133,934 60	
Feb. 20, 1903..	For additional distributing mains	750,000 00	236,750 00	
	For substituting new for old pipes	200,000 00	422,247 50	
	For acquisition of real estate and the payment of other proper and necessary expenses in connection with the sanitary protection of the watershed	50,000 00	213,626 15 60,302 50	
July 15, 1903..	For substituting new for old pipes, extending distribution system and infiltration gallery system at Massapequa, L. I.	350,000 00 650,000 00	81,430 12 475,822 50 111,817 00* 77,398 00*	Map of land required for Massapequa submit'd.

*Charged against balance on appropriation made in 1901.

Protection of Supply from Pollution.

A map to a small scale has been made showing all the nuisances existing on the watershed and classifying them under three grades, i. e., Nos. 1, 2 and 3. In No. 1 grade are grouped those nuisances which are active sources of pollution at present; in the second grade, those which may readily become sources of pollution; and in the third grade those which become sources of pollution only when there is a heavy surface flow.

This classification was deemed advisable to point out the order in which measures for the suppression of the nuisances should be taken up. The lack of adequate force has made it impracticable to prepare the maps (which demand an extraordinary amount of troublesome details) required to effect the purchase of lands and buildings so as to eliminate sources of pollution. While special measures will naturally be required in specific cases, the main features of the general policy recommended by this Bureau may thus be outlined:

Abatement of nuisances either by purchase of land or by filtration, the selection to be determined by a study of the cost of either plan, taking all the factors and surrounding circumstances into consideration.

A conservative plan, where filtering may be resorted to, "making the plants for the individual streams as simple and economical as possible, consistent with efficient operation, since these small plants would be abandoned if the entire gravity supply be ultimately filtered or discontinued."

Purchase of only such lands and buildings on the old watershed as are now or in the immediate future likely to become offensive and filtering of the rest of the water from the surface streams, since on the old watershed the City owns little land and the price at which it could be purchased is relatively high. On the new watershed, where much more land is owned by the City, additional purchases, so as to entirely protect the supply where practicable and where the cost of such purchases would be high, filtering of the stream waters and provision simply for a protecting zone along the bank of the streams where practicable.

In my report of last year, and in previous ones, I called attention to the extreme difficulty of enforcing the regulations of the State Board of Health for the protection of streams and ponds used for water supply and under which years may elapse before adequate remedy is obtained in any case outside of the City's boundaries. I fully discussed this question in that report, to which I beg to refer, giving in full, instances in our own experience to show the utter inefficiency of present provisions to secure an adequate remedy, even with the co-operation of our Municipal Board of Health. A modification of these regulations, and particularly an enlargement of the powers of the Local Boards so as to render their action more efficient against transgressors, seems to be imperative, as well as the substitution of a simple mode of procedure in place of the exceedingly cumbersome and almost farcical method now prescribed under the statute and which renders all efforts to abate nuisances on the watershed totally barren of useful results.

Sanitary Inspection and Patrolling of Streams—The regular patrolling of our streams and the inspection of the watershed have been continued during the year, as detailed in previous reports. A detailed schedule of the work done by our men on the line has already been given and the results of the analyses form part of the report on the laboratory work.

Mount Prospect Laboratory.

The work at the Mount Prospect Laboratory has been largely increased since the beginning of the year by including the examination of the water supplies from all the other boroughs in Greater New York, and particularly by the numerous experimental investigations required by the Commission on Additional Water Supply. The prosecution of this latter work particularly has necessitated a large increase in the working force, general equipment and space devoted to the laboratory in our Mount Prospect Gate House, and to provide for these changes the office of the Keeper of the Reservoir had to be transferred to the basement and the former store-room was given up for the extension of the Chemical Laboratory. The biological work, as heretofore, has been in charge of Mr. G. C. Whipple, and the chemical work, cement and coal tests, etc., has been in charge of the Chemist, Mr. D. D. Jackson.

The quotations hereinafter given are extracted from their joint report, as well as the following summary of the work accomplished during the year, including work done at Katonah and Poughkeepsie, N. Y., Laboratories:

Water Analyses.

	Number of Samples Examined.
Brooklyn	4,779
Manhattan	2,870
Queens	162
The Bronx	155
Richmond	112
Commission on Additional Water Supply	9,945
Total number of samples received	18,023
Physical examination	16,018
Chemical examination, complete	1,429
Chemical examination, partial	7,734
Microscopical examination	3,053
Bacteriological examinations	6,172
Bacteriological examinations, coli tests	4,674

General Analytical Work.

Sand samples examined	2,050
Cement samples examined	66
Coal samples examined	38
Oil samples examined	33
Brass and bronze examined	14
Boiler compounds examined	7
Magnesia asbestos examined	17
Paint samples examined	3
Alum samples examined	4
Asphalt samples examined	3
Special tests and experiments	67
Boiler water	16
Boiler scales	8

With the object of co-operating as fully and efficiently as possible with the purposes of the Commission on Additional Water Supply, the work required by that Commission from the laboratory has always been given precedence over the work for this borough, although at times this has caused much delay, inconvenience and loss. The amount and character of the work done at the Laboratory under the direction of the Commission will, no doubt, be referred to and discussed by the latter and need not, therefore, be further referred to here. For the same reason no reference shall be made to the work done in the analyses of the supplies for Manhattan, The Bronx, Queens and Richmond. The addition of this work to that formerly made in connection with the Brooklyn supply has necessitated some changes in the schedule we had hitherto observed. The schedule now observed is practically uniform for all the boroughs, and in the Borough of Brooklyn is as follows:

Daily samples are taken from the terminus of the aqueduct at Ridgewood and from the tap in Brooklyn, and these samples are examined physically and bacteriologically, and weekly samples are collected from the distribution reservoirs and other taps in the City. These samples are submitted to a complete sanitary analysis. Weekly samples are also collected from the surface supplies and examined physically and bacteriologically. The chemical analysis has been made once a month. Samples from the driven well stations have been analyzed monthly or quarterly, as occasion seemed to require or the needs of the work allowed. The Laboratory report indicates that many of the results obtained by the chemical analysis may be of comparatively little value in the practical supervision of the supply, and that changes from the present schedule should tend to further reduce the chemical analysis and increase the number of physical examinations and tests for B. coli.

As already stated, due attention has been given to the inspection of the Brooklyn watershed, particularly in connection with the preparation of the revised Map of nuisances, already referred to. Repeated inspections were made of the Italian camp located at Elmont, and of the camp at Wantagh, near the infiltration gallery now under construction.

In the laboratory report attention is called to the reduction in the amount of chlorine and hardness in the water, no doubt due, in a large measure, to the heavy rainfall during the year, which, in turn, made the color slightly higher than usual. The report further says:

"It will be noticed that the number of samples which have positive tests for bacillus coli have increased considerably. The figures given for this year, however,

are not strictly comparable with those of previous years, because of a slight change in the method, which was inaugurated the first of this year. According to the method now practiced, tests for bacillus coli are made in three quantities of water, 0.1 c. c., 1 c. c. and 10 c. c. The results of the daily samples collected at the Ridgewood Pumping Station show that 4.4 per cent. of the samples contained bacillus coli in .1 c. c., 17.3 per cent. in 1 c. c. and 28.7 per cent. in 10 c. c. The average number of bacteria in the water at Ridgewood has been about normal, the average for the year being 343 per c. c."

In previous reports I have alluded to the lesser importance of the bacillus coli tests as indicative of pollution. The advantages of the change of method in testing for bacillus coli, referred to in the laboratory report, seem obvious. With reference to the development of microscopic organisms, the results are reported as follows:

"The present year has not been a favorable one for the development of microscopic organisms in the distribution reservoirs, and excepting in Mt. Prospect reservoir, no very extensive growths have occurred. The average number of microscopic organisms in the tap water has accordingly been somewhat lower than usual, and the odor of the water has been correspondingly somewhat better. In spite of the increase in the tests for bacillus coli, the reasons for which have just been mentioned, there is no reason to believe that the sanitary condition of the water has been less satisfactory during the past year than during the preceding years covered by the analyses. It is believed, however, that the new method of testing for bacillus coli presents in truer light the frequency with which this organism is found in the water than the former methods."

The official tests of the mechanical filter plants at Springfield and Baiseleys, which were started about September 1 at Springfield and about October 1 at Baiseleys, imposes a large amount of work on our laboratory force, owing to the number of analyses required. This work has been properly attended to and will be discussed further on.

Considerable work was done by the laboratory last year and during the present year to determine the possible danger of pollution of water passing through the soil, in connection with the infiltration galleries then proposed and now under construction. Several results of these experiments are quoted and referred to further on. As stated in the laboratory report, under discussion, "they include many bacteriological examinations of sand collected at various places and at different depths, with a view to showing the decrease in the number of bacteria downwards from the surface. From the results obtained it was quite evident that the effects of surface pollution under the conditions existing on Long Island do not extend below 6 or 8 feet, and the results appear to corroborate the more extensive investigations recently made in England upon the same subject." These conclusions had already been arrived at by our previous experiments and are recorded in former reports, which are referred to further on.

The establishment of the Italian camp at Elmont, to which reference has already been made, afforded an excellent opportunity to further experiment on the subject of sub-soil pollution, and for this purpose a number of driven wells were sunk at different depths around the latrine there used, and frequent samples of water taken for analysis. The results were directly reported to the Commission on Additional Water Supply and will not, therefore, be discussed. It will be sufficient to state that while the samples examined indicated a high degree of pollution, the number of positive tests for bacillus coli was surprisingly small, thus confirming the inference already well established of the unusually favorable character of the Long Island sand for removing sub-surface pollution. In the report under discussion it is stated that "it seems probable that with the ordinary fine sands and with low velocity of flow, water would be rendered practically safe for use by passing through a horizontal distance of about twenty-five feet."

Numerous sand analyses were made in connection with the design of filter plants at Hempstead and Forest Stream, to determine the character of the local deposits, from which it was ascertained that suitable sand for the Hempstead filter existed in situ, and that sand suitable for use in the proposed filter at Forest Stream could be obtained within a reasonable distance from the filter bed. The latter, however, would have to be washed before being used, with a waste probably not exceeding 33 per cent.

In connection with the experiments of the Commission on Additional Water Supply, it is reported that some 2,000 samples of sand were analyzed.

Filter Plants at Baiseleys and Springfield and Filter Bed at Hempstead.

The official tests of both plants provided by contract is under way. From all indications, it appears that the results obtained will conform to the specifications. Some failures during the period of tests have been due to defective manipulation on the part of the contractors, and not to defective construction of the filters, and to avoid this source of delay and possible resulting complications, I recommended to the contractors the employment of a competent inspector to supervise the proper operation of the plants during the tests. They have acted on this suggestion, and the results have been almost uniformly satisfactory since the change was made. On completion of the tests a special report on the same will be made. When these plants are brought into service they will have to be under charge of a competent inspector, whose duties shall be the proper manipulation of the filters. In June last I recommended the appointment of such an inspector, deeming it important that he should have time to familiarize himself with the operations of the filters, and making an allowance for the time necessary to secure the appointment, but it has not been made yet, owing, as I understand, to some difficulty in regard to the examinations.

The filter bed at Hempstead will probably be completed during the present month. The progress of the work under this contract has been most satisfactory.

Atlantic Avenue Improvement.

The removal of our water mains to co-operate with this improvement has been actively carried on. There are no special features requiring comment here. The most important part of this work, which is the by-pass from Carlton avenue to Flatbush avenue, will probably be completed by the end of the winter.

Works Proposed for the Extension and Improvement of the Supply, but for Which Contracts Have Not Been Let.

Remodeling of New Lots Station—The buildings at this station are entirely inadequate for their purpose. The Engineer's quarters are right over the engine room and the house is a frame building, so that complete stoppage of service may at any time occur from burning of the superstructure. The Engineer and his family have often and earnestly complained, both on account of the danger to which they feel they are exposed and on account of the noise and vibration caused by the engines. The latter, furthermore, are old and uneconomical, and if this station is to be continued it would be economical to replace them with engines of higher duty, since the total lift, plus friction head, is about 190 feet. If the test of the new deep wells proves successful, an appropriation for remodeling this station should be asked. If it be decided that the Mt. Prospect mains should not be utilized to supply the high section of the borough lying near the Ridgewood Reservoir, a standpipe should be provided in order to secure adequate pressure and supply. For this purpose it will probably be economical to utilize the standpipe at present attached to the Ridgewood by-pass, since arrangements can be made to operate the latter without the standpipe.

Extension of Ridgewood Old Station—At the Ridgewood Station on the north side the three triple expansion engines, erected by Henry R. Worthington under his contract in 1897, 1898 and 1899, are the only modern and comparatively economical engines. The No. 3 beam engine, which was erected in 1869, is cumbersome and uneconomical, and the Davidson engine, though more modern, having been erected in 1884, likewise shows a low economy. It would not be safe to estimate on pumping more than 60,000,000 gallons per day from the North Side Station with the present equipment. On the south side the engines, while only about twelve years old, require a great deal of repair and are not economical. The south side engines can only be depended upon pumping 40,000,000 gallons a day, making the total safe working capacity of the station about 100,000,000 gallons per day. As the average consumption for 1904 will probably be fully that amount, it will be necessary to either remove some of the old engines and replace them with new engines, or to install an additional engine or engines on the south side.

An appropriation should be asked as soon as practicable for the new building, engines and boilers required at Ridgewood for the Mount Prospect service, since it would not be prudent to estimate less than two years for the completion of this work. In my last year's report, I discussed this question and gave approximate estimates of the cost of new buildings, engines and boilers at Ridgewood, this cost only covering the installation necessary for the Mount Prospect service, and also showed the resulting economy from the transfer of pumping from the Mount Prospect to the Ridgewood Station. Should this recommendation be approved, the above estimates can be readily revised and further details worked out.

Metered and Unmetered Water.

In my last Annual Report I discussed the inequality of the metered rates as compared with the unmetered rates, and the Pitometer measurements made this year confirm the statements made in that report, to which I beg to refer for details. The following schedule shows the annual revenue per 1,000 gallons for nine districts where the metered and unmetered supply was measured:

Annual Revenue, Based on One Thousand Gallons.

District No.	Total Supply.	Metered Supply.	Unmetered Supply.
1	$0.092	$0.133	$0.064
3	.039	.133	.033
4	.0018	.133	.046
5	.107	.133	.018
6	.0915	.133	.089
8	.1065	.133	.011
9	.0675	.133	.063
10	.0712	.133	.037
11	.0725	.133	.046

A brief description of these districts, which is given in greater detail further on, will aid to explain the variation in revenue from the unmetered supply.

District No. 1 is a medium class residential district with one large metered consumer.

Districts Nos. 3, 10 and 11 are tenement districts, there being a number of metered consumers in Districts Nos. 10 and 11.

District No. 4 is a residential district composed of high grade hotels, apartment houses, boarding houses and private dwellings.

Districts Nos. 5 and 8 are purely manufacturing districts, the percentage of unmetered taps there being very small.

Districts Nos. 6 and 9 are solely residential districts of the middle to high class type.

The foregoing figures show that the revenue from the unmetered supply is lowest in the manufacturing district, owing probably to the very few unmetered taps in the district; all leakage and under registration of meters would be charged to the unmetered supply, making the revenue per thousand gallons appear much lower than it actually is. It is somewhat surprising to find that among those selected, the next class of districts showing low revenue from unmetered supply are the tenement districts, it being generally considered that the latter pay higher water taxes than warranted by the actual amount of water consumed and wasted. In our case the use and waste in the tenement districts appear comparatively greater than in higher class districts, on the basis of revenue received. The revenue from District No. 4, which is a high class district, is only slightly higher than that from the three districts just mentioned. This is due probably to a comparatively high rate of leakage through the boundary gates. These gates are old and the difference in pressure between the high and low service supply amounts to about 22 pounds.

The highest revenue obtained from unmetered supply was in Districts Nos. 6 and 9, and as District No. 9 is a high service district, it is probable that the revenue per thousand gallons would be increased were it possible to prevent all leakage through the boundary gates. These gates are in better condition than those forming the boundaries for District No. 4, and the leakage through them would naturally be less.

The above table of revenue gives a concrete example of the inequalities of charges resulting from payment for water on a frontage or house basis, instead of payment based on the actual amount of water consumed. While in this case the burden of the higher rates falls on those who are better able to carry it, it is nevertheless an unjust distribution of the charges, and it is especially unjust to the metered consumer, who pays at a rate far in excess of that paid by adjoining property owners.

Pitometer Tests.

In the last Annual Report I referred to the arrangements which had been made early last year to use the pitometer in order to determine the flow and pressure in our existing mains, so that we might advantageously locate the proposed new trunk mains, and also to investigate leakage and waste as far as practicable. Mention was made therein of the recording apparatus originally invented by the late Mr. Flad as an improvement on the old and well-known Pitot Tube, and reference was made to the experiments made by us to ascertain the merits of the new device. As there explained, we were ready to commence our experimental tests as far back as February, 1902, but were unable to obtain the instruments which Mr. Cole had arranged to furnish us, as he was required to use them for certain other engineering investigations in Manhattan which the Department deemed urgent. In April of the current year we received some of the pitometers and at once undertook the measurements of the flow through our trunk mains in order to determine which of these needed relief and which were not carrying their full capacity. The results obtained from this examination were valuable, aiding us to properly design the new trunk mains now under construction, so proportioning and locating them as to afford relief where needed through insufficiency of the old mains, and also to obtain the maximum service from those of the latter which were not doing all the work they could, by proper cross connections.

Diagram No. 3 is a typical one, showing the velocity of flow in trunk mains at various points between the Reservoir and the lower end of the main.

Diagram No. 4 is typical of the flows found in some of the small or distribution and cross-connecting mains. This diagram shows the extremely small flow found is the 30-inch main in Raymond street connecting the 48-inch main on Willoughby avenue with the 48-inch main on Atlantic avenue.

The pitometers were also used to measure consumption and waste. For this purpose eleven districts, shown in Diagram No. 15, were selected in various sections of the City, and numbered consecutively from 1 to 11, as follows:

District No. 1 was selected for a Mt. Prospect Tower district, and included manufacturing establishments as well as low and medium class dwellings.

District No. 2 represented the dry goods district, fronting on Fulton street, between Flatbush avenue and Boerum place.

District No. 3 was a typical tenement district of the poorer class.

District No. 4 was the Mt. Prospect Reservoir Heights District, and included office buildings, hotels, apartment houses and dwellings.

District No. 5 was a manufacturing district.

District No. 6 was a typical middle class to high class residential section.

District No. 7 was a low class residential and flat district, including a large number of places where water was used for commercial purposes.

District No. 8 was a manufacturing district, similar to District No. 5.

District No. 9 was a medium grade to high grade residential district, the supply being derived from the Mt. Prospect Reservoir service.

Districts Nos. 10 and 11 were large districts, covering low-grade flats and dwellings, with a number of buildings using water for manufacturing purposes. There is a larger proportion of buildings used for industrial purposes in District No. 10 than in District No. 11.

It will be seen that the districts selected represented almost all conditions existing throughout the borough. The total results of the investigations in these districts are given in Table No. 10 and in Diagrams Nos. 6 to 13. I will give in addition, however, a brief description of the work done and the results accomplished in each district.

District No. 1—This district was selected as representing the Mt. Prospect Tower service, and included several places where water was used for manufacturing purposes, together with low-class, medium and high-class residences. The original

test of the district showed a very high flow, which increased instead of decreasing at night, and which also increased when the water level in the tower was raised. This indicated that a portion of the flow at least was passing through the gates forming the boundaries of the district, and a night subdivision was made to localize the trouble. The results of this subdivision showed that the tower water was flowing into the Mt. Prospect Reservoir system through a 20-inch gate, which was partially opened. This gate was closed with considerable difficulty and the flow into the district again measured. Diagram No. 5 shows the average flow into the district just before and after this gate was closed. It will be seen that the average daily flow was 1,530,000 gallons before and 368,000 gallons after, thus causing the unnecessary pumping of 1,162,000 gallons daily into the tower. This waste through the gate was much larger at this time than usual owing to the water level in the tower being kept at a higher level than normal. The pumping records before and after closing the gate indicated that the average loss through the gate was about 400,000 gallons daily. The shutting of the gate also increased the pressure generally in the district and stopped complaints which had previously been made from lack of adequate pressure. The average daily per capita consumption after the 20-inch gate was closed was 77.5 gallons. This would seem rather high were it not for the fact that the metered consumption amounted to 30.5 gallons, leaving 47 gallons per capita as the unmetered consumption, including leakage. The measured leakage amounted to six gallons per capita, leaving a net unmetered consumption of 41 gallons per capita. It would be well to call attention to the fact that the results obtained from the measure of leakage are probably in every case lower than the actual leakage. This is due, first, to the inability of the Inspector to catch all the leakage from closet bowls and similar receptacles; and second, to the diminished pressure during the time when the measurements of leakage are obtained. The second factor is especially important in cities like Brooklyn, where the pressure is low and the difference between the night and day pressure is felt decidedly. In many houses there is a very slight flow during the day time in the upper stories, while at night the pressure is sufficient to give a rapid flow. This fact should be borne in mind in connection with the recorded measure of leakage. This district showed a rather high night flow, and it is probable that this was partially due to leakage through the gates forming the boundaries. As these gates were only temporarily closed, it was not deemed advisable to spend any further time in attempting to localize the leakage.

District No. 2—Complete measurements were not made of the flow into this district, as the night rate was shown to be extremely low, and it was not deemed advisable to spend further time on the investigation. The records taken showed an average flow of about 200,000 gallons daily.

District No. 3—The average daily consumption per capita for this district was 52.4 gallons, including the metered consumption, which amounted to only 3 gallons per capita, giving a net consumption of 49.4 gallons. The measured leakage was 10 gallons per capita, or leaving 39.4 gallons as the net unmetered consumption. The night flow in this district was rather high, but it was not deemed sufficient to warrant a further investigation. It will be seen that the gross consumption per tap in this district was higher than in any of the residential districts tested, although the consumption per capita was decidedly less.

District No. 4—This district includes a large number of hotels, apartment houses and boarding houses, together with a few office buildings and manufacturing establishments. The observed consumption was high, amounting to 98.5 gallons per capita. This was due somewhat to the character of the section, but to a great extent to the leakage through the boundary gates. A night subdivision was made of this district and showed that the consumption and leakage was general throughout the district. As the boundary gates were in most cases set over forty years ago, leakage through them would naturally be expected, and unless new mains can be laid along the boundaries, thus doing away with the dead ends (already referred to in this report) it will be necessary to cut out and replace many of these gates. The measured leakage from house fixtures was 10.8 gallons and the metered consumption 17.7 gallons per capita, thus leaving a net unmetered consumption of 70 gallons per capita.

District No. 5—As already stated, this district was chosen as a typical manufacturing district on the river front, with all the service metered, it being expected that leakage would probably be found from dead ends, and possibly from open connections on the river front, as well as from pipe damaged by electrolysis. The total number of recorded meter service is 42, of which there are 7 meters on the supply pipes of the American Sugar Refining Company, and 35 other meters.

The first measurements made showed a very high flow, increasing with the pressure at night, and which could only be accounted for on the supposition that the water passed through an open connection, either to the river or to the sewer. Considerable work was done to account for the unmeasured water, and the details of this work, as well as the results obtained, were embodied in my communication to you of August 25 last, from which I quote as follows:

"The pitometer was originally placed on the 20-inch main on South First street, between Kent avenue and Wythe avenue, and the gates on the side streets just east of Kent avenue were closed, so that the supply was furnished by the 8-inch and 12-inch mains on Kent avenue. Owing to the large drafts from the Kent avenue mains, it was deemed advisable to close during the day the 8-inch and 12-inch gates at Division avenue, the mains being fed at this point from the 20-inch mains on Division avenue. These gates were therefore closed at about 7 p. m. and opened at about 7 a. m. each day.

The original record showed a very heavy night flow, which seemed to increase with the increase in pressure. The district was therefore tested by cutting off a few blocks at a time, and the main flow was found to be from the 12-inch main between South Sixth street and South Third street.

On the night of August 14 the pitometer was therefore placed on the 12-inch main 90 feet south of South Fourth street. The water flowing into the 12-inch main between the pitometer and the gate on the line on the north side of South Second street was measured between the hours of 11.20 p. m. on August 14 and 1.25 a. m. August 15. The flow in the main was then reversed by changing the gates and measurement made of the amount passing into the 12-inch main between the pitometer and the gate on the line on the south side of South Sixth street. This measurement lasted from 1.35 a. m. to 3.38 a. m. The record of this test showed that there was practically no flow in the 12-inch main south of the pitometer, but that there was a heavy flow north of the latter; this flow, however, checking quite closely with the five meters located in the American Sugar Refinery Company's buildings as follows:

Two 4-inch Gem meters on the east side of Kent avenue, between South Third and South Fourth streets.

One 2-inch meter on the west side of Kent avenue, between same streets.

One 10-inch and one 2-inch meter on the west side of Kent avenue, between South Second and South Third streets.

The flow by meter was measured from about 9 p. m. to about 2 a. m., and showed about 1,870,000 gallons for twenty-four hours, while the pitometer showed a rate of 2,160,000 United States gallons for twenty-four hours, or about 10 per cent. more, a result close enough, taking into consideration the short period of the test.

The examination of the average flow through the 10-inch meter for the past year indicates that it registered about 68,000 cubic feet per day. The meter was first read for the pitometer test on July 18, and read again on July 19 and July 20, August 14 and August 20. These readings show the following daily rate of flow:

July 18-19, 51,300 cubic feet.
July 19-20, 110,800 cubic feet.
July 18-August 14, 180,000 cubic feet.
August 14-20, 210,000 cubic feet.

Tables are being prepared showing the present and previous rates of flow of all the meters in the Kent avenue district.

The data given by the Water Registrar's office shows a by-pass pipe around the 10-inch meter which was not sealed, and also shows an unmetered fire service connection, which it was stated was tapped for use for waterclosets in the building, under authority conferred by the Board of Aldermen. The company states that the by-pass has not been used.

The following table gives the comparison between the metered and unmetered rate in District No. 5 at four different periods between July 15 and November 21:

Date.	Metered Rates.	Unmetered. Rates.	Total Consumption.
July 15-19	1,420,000	3,260,000	4,680,000
August 20-21	3,240,000	400,000	3,640,000
September 12-14	2,140,000	690,000	2,830,000
November 19-21	2,300,000	355.000	2,655,000

It will be noticed that there was a decided reduction in the total consumption between July 15 and September 14, and that since that time there has been but little variation in the daily consumption and the proportion of the metered rate to the unmetered rate has not varied materially.

Diagram No. 9 gives graphically the results summarized in the above table, together with metered rates in the district from March, 1900, to November 21, 1903.

After the results given in my report of August 25 had been obtained, you directed that the streets in District No. 5 should be opened in order to ascertain what water connections existed. This work has already been referred to and the annexed diagram (Diagram No. 14), shows these connections. It is of interest to note that the examination of the mains showed practically no leakage and the unmetered flow in the district is very possibly largely due to underregistration of the meters. It would, of course, be expected that there might be some variation between the pitometer measurements and the metered rates due to inaccuracies in both forms of meters.

District No. 6—This district represents an almost entirely residential district, the majority of the houses being of the middle to high-class type. The average daily consumption per capita was 58.6 gallons, the metered consumption being 2.9 gallons and the measured leakage 4.5 gallons. This left a net unmetered consumption of 51.2 gallons. This district also showed a rather high flow, but not sufficient to warrant a detailed investigation.

District No. 7—The low pressures existing in this district and the difficulty in feeding it, made it impossible to carry on the investigations, and after one or two preliminary measurements, the work was abandoned.

District No. 8—This district was a counterpart of District No. 5, and the investigation was made there on account of the results obtained in District No. 5. The results so far obtained show a high metered consumption, together with a rather large unaccounted for flow. Investigations have not yet been completed in this district and a detailed report cannot be made until further measurements have been taken.

District No. 9—This district was the recently formed Clinton Avenut Mt. Prospect Resevoir District, and the measurements showed a gross consumption of 86 gallons per capita. The metered consumption was 5.1 gallons, and the measured leakage 5.2 gallons per capita, leaving a net unmetered consumption of 75.7 gallons per capita. The consumption per tap was, however, 534 gallons, as compared with 805 gallons in District No. 3, where, as has previously been stated, the net unmetered consumption amounted to 39.4 gallons per capita. This district is one in which a high per capita consumption would be expected on account of the high-class residences constituting the district. Some of the consumption would also be accounted for by the leakage through the boundary gates, there being a difference in pressure of about 25 pounds between the high service and low service sides of the gates.

District No. 10—This is a large district, measured to determine whether it was advisable to make a detailed investigation. The results showed a large unmetered consumption, and, as most of the buildings are metered, it will probably be advisable to subdivide the district.

District No. 11—The comparatively high unmetered consumption and night flow in this district made it advisable to have a waste survey carried on, which is at present under way, but complete results have not yet been obtained.

The following table gives a summary of the more interesting results obtained from the tests in the residential districts:

District No.	Character of District.	Population.	Average Daily Consumption Per Capita. Measured House Leakage, Gallons.	Metered Consumption, Gallons.	Unmetered Consumption, Gallons.	Total, Gallons.	Revenue Per Thousand Gallons. Metered Supply.	Unmetered Supply.
1.	Low to middle class residential	4,755	5.9	30.0	41.1	77.0	$0.133	$0.064
3.	Tenement	8,000	9.9	3.0	39.1	52.0	0.133	0.033
6.	Middle to high class residential	3,752	4.5	3.0	50.5	58.0	0.133	0.089
9.	Middle to high class residential, with a large proportion of high class residences	3,745	5.2	5.0	75.8	86.0	0.133	0.063

Subject to the reservations made further on, when discussing the purely general character of the indications obtained from the pitometer measurements, the deductions from the above tabulated results appear to be:

First—That the actual consumption per capita in the Borough of Brooklyn is not large.

Second—The disparity of charges made in the different districts for the unmetered supply is considerable, and there is a still greater difference in the charges for metered and the unmetered supply, thus showing the advisability of a more equitable readjustment of rates, as recommended in the last annual report.

Third—That the waste from house leakage is sufficiently large to warrant a house to house investigation, at least in some sections, unless meters are installed. This is especially true owing to the increased night pressure, since the measured house leakage is unquestionably less than the average rate of leakage during the day and night. For obvious reasons, measurements of night leakage at the houses have not and cannot readily be made. This is to be regretted, as it deprives us of means of determining the percentage of night flow to average consumption. The determination of this night leakage at the houses would be particularly valuable, since, owing to the low velocity of flow at night, the pitometer readings are more subject to error. Perhaps it may be practicable to accomplish our purpose by cutting off the supply, using the curb cocks. This plan, however, presents considerable difficulties, because many of these curb cocks are out of order, and they are in every case the property of the house owners, who would object to bear any portion of the costs of repairs or renewal where needed.

Fourth—The leakage from our street main is small. It should be stated, however, that this deduction is based less on the results of the pitometer measurements, which, as already stated, have been few, than on the examinations of the uncovered mains, which almost invariably have shown the joints to be in good condition and the leakage to be extremely small. We have, however, found sometimes, leakage through the boundary gates of the districts, particularly in one case, in which a complete waste survey was made of a district not included in the above table and in which, owing to a decided difference in the pressure along the boundaries, the leakage through the gates was considerable.

The results above given for District No. 9 are undoubtedly also affected by leakage through the boundary gates.

Fifth—In the last Annual Report it was stated that the reduction in consumption to be expected in Brooklyn from the adoption of meters would by no means be as large as had been often reported, and the investigations under discussion confirm this view. There would be, however, sufficient reduction to warrant the installation of the meters.

The results obtained in District No. 5 have been already discussed.

I had already stated in the last Annual Report that imperfect plumbing and carelessness of use during periods of extreme temperature, rather than leakage in our large street mains, were the cause of such waste as would be found in Brooklyn. The observations above recorded confirm this view, showing that where the taps are metered the meter records account for practically all the water passing through the mains.

The greater part of these investigations was intended to check the metered consumption in manufacturing districts, and the more valuable and direct results were obtained in this direction. From the investigations made, as outlined above, I do not see that the waste can be efficiently checked, except by the use of meters in a large proportion of the services. It would probably be unnecessary to meter all services, as experience in other places shows that the efficient limit of metering is reached before the meters have been placed on every service. I would refer to my last Annual Report for a detailed discussion of the question of metering the Borough. A house to house inspection, if made frequently and honestly, will reduce the waste from leaky fixtures, but in order to adequately reduce the waste, both from leaky fixtures and other causes, it is necessary that the consumer shall realize the necessity of turning off the stop cocks when the water is not required, and understand that the water is no cooler after it has run for ten minutes than when it has run for a much shorter period, and also that it is unnecessary to have a faucet running open full to prevent freezing of pipes during extreme cold weather. This education shall be complete only when, under a metered service, the consumer shall realize the advantages of paying simply for the water he actually needs and uses.

For waste detection, the pitometer measurements are of value only in checking up the metered consumption in manufacturing districts and determining those districts where the night flow is great enough to make a house to house inspection advisable.

The pitometers were used to determine the percentage of slip on the Mount Prospect Reservoir engines and on the Gravesend and New Utrecht engines. These results indicated a comparatively high slippage. An examination of the Mount Prospect engines showed no apparent cause for the slippage. The measurements were made on a large main where the velocity was low, giving a greater chance for error in the pitometer measurements. If opportunity offers, a test will be made by diverting the flow from the engines into a small main and then measuring the amount of flow with the high velocity. At New Utrecht and Gravesend the engines were examined and put in good order, but a high slippage would naturally be expected where engines are drawing from driven wells.

Pitometer measurements were made to determine the sections where leakage existed between the Mount Prospect Reservoir and the Ridgewood Reservoir System. This work is still being carried on, and it is hoped that it will enable us to definitely locate any large leaks which may exist between the two systems.

After the experiments made in the beginning of 1902, already referred to, I decided to adopt the pitometer for the investigations above discussed on account of the simplicity of the instrument, constant record obtained and comparative rapidity of work, although conscious of the various sources of error which, as in all such instruments, have to be guarded against and which would be extraordinarily increased, to the point of nullifying results, unless the instrument is in the most competent hands. These errors are to be taken into account particularly in the case of mains with low velocities, or in attempting to ascertain house leakage, which, unless unusually large, would not be accurately determined; and the errors from this cause are less important where the velocity is comparatively high. Undue value should not be attached therefore to the results obtained, and the experiments should be checked and repeated. Our experiments showed that, even making all reasonable allowances for these sources of error, the results to be expected from the instruments would be close enough for all practical purposes in the more important investigations to be undertaken, which were those relating to the flow through our large mains. For the foregoing reasons, however, we have aimed at general results and indications rather than at a refinement of measurements or deductions, which might be misleading.

Under the contemplated arrangements with Mr. Cole, after our full discussion of the subject, he was to handle the instruments and take all readings and records, but as Mr. Cole was assigned by the Department to the other investigations in Manhattan already mentioned, Mr. T. C. Phillips, who had worked under Mr. Cole and was familiar with the use of the pitometer, came in Mr. Cole's place. Mr. Phillips handled the instruments, took the readings and records during the first part of the work and superintended the taking of these records and readings by our men after the latter had become familiar with the handling of the instrument, being assisted by three of the Rodmen from our office. We gave Mr. Phillips the location of the taps on which observations were to be taken to determine the flow in the trunk mains, the location and outline of every one of the districts on which the measurements of waste, etc., were to be made, and all general directions required to make the desired investigations. The whole of the office work required in the investigations on the flow in the trunk mains, including the working and plotting of the records, was done by our office force. The tabulation of the measurements in the various districts and preparation of diagrams was also done by our office force and generally supervised by Mr. Phillips. The latter was also put in charge of the Laborers who excavated the streets to find the connections at or near the Sugar House, to which reference is made in discussing the results of District No. 5. Mr. Phillips severed his connections with this Bureau on the 5th inst., and the readings and taking of records are now attended to entirely by our men.

The data in regard to the population of the districts were furnished by the Tenement House Commission, who cheerfully co-operated with us to the fullest extent and readily furnished us all the information in their possession.

The house to house inspection to determine inside leakage, as well as the reading of the meters, was done by the Water Registrar's office, to whom, from time to time, we sent the necessary requests specifying the work to be done, and who gladly furnished us the required data.

Consolidation of Pumping Stations.

We have no more important economic problem in this Bureau than the consolidation of pumping stations, often referred to by us in the past. In the report for the quarter ending September 30, 1902, and in the last annual report, this question way again discussed and the large economy and increased efficiency to be obtained by the consolidation of the New Utrecht and Gravesend and of the Mt. Prospect and Ridgewood stations was demonstrated. A general outline was also given of the plan to reduce the line stations to nine, preparatory to possible further concentration.

The magnitude and importance of this question has been discussed before, and a sufficient idea of the same may be obtained by bearing in mind that we have at present twenty-three separate pumping stations, each with a separate personnel and a corresponding salary account. The plans for successive additions to our supply, as demanded by our needs and allowed by the available appropriations, have been designed so as to facilitate consolidation as far as practicable, and this has been borne in mind particularly in designing the pumping plants and engines for the proposed infiltration galleries. The full development of the ultimate plan of consolidation in all its details, and with the requisite estimates to determine the maximum efficiency and economy attainable, requires, however, as may be readily understood, the most careful study and consideration and much time and labor.

Pending the completion of such detailed plans and estimates, a broad outline of existing conditions, suggested possible changes and results to be expected therefrom may be of interest and advantage. For this purpose the figures used must necessarily be simple approximations.

Thus, the total amount of water pumped at Ridgewood during the year 1902 was 33,570,000,000 gallons, of which there were pumped again at the Mt. Prospect Station 3,302,000,000 gallons.

The following table shows the amounts and percentages of water that has been pumped one or more times, i. e.:

Number of Gallons Pumped.	Percentage of Total.	Number of Times Pumped.
3,324,000,000	9.9	Once
25,346,000,000	75.6	Twice
4,685,000,000	13.9	Three times
215,000,000	0.6	Four times

The total cost of pumping this amount of water, including interest and sinking fund charges, was, in round figures, about $516,000, or, on an average, six and three-fourth cents (6¾c.) per foot million gallons. This is a high charge, even taking into consideration that it includes the interest account and sinking fund allowances corresponding to the total outlay at each station both for obtaining the supply therefrom and for buildings and machinery. If, therefore, only the simple cost of pumping were to be considered, there would be no difficulty in showing that it could be so reduced as to warrant the abandonment and substitution of the old stations by new ones provided with modern and efficient machinery. But the problem is much more complex, since in devising a plan to pump the supply only once, we have to take into account the cost and maintenance of new and expensive conduits in some cases, as well as a certain proportion of the interest on the cost of the abandoned plants, which should be properly charged.

The true economic solution, therefore, probably lies somewhere between the present method, with the repeated pumping already shown, and that of one single pumping for the whole supply, and considerable detailed work and calculations would have to be completed before this point could be satisfactorily ascertained.

As already stated, we should not lose sight of the fact that a radical change in the system of pumping involves corresponding changes in our conduits.

Infiltration Galleries.

In previous reports I have recommended the development of the underground supply, even when more or less at the expense of surface sources, and advocated for that purpose the adoption of infiltration galleries in preference to other methods suggested or now in use. In my report for the quarter ending June 30, 1902, and in my last annual report, the subject was again reviewed and at some length; the adaptability and advantages of this plan to procure a supply from Suffolk County, if such an extension were decided upon was pointed out, the general method of construction and main features of the galleries were specified, and the number and approximate location of the infiltration galleries required for the ultimate development of the old watershed, from Spring creek to Massapequa, was given. There were to be nine such stations.

Further experiments and study of the matter, as well as observations on the ground at the infiltration gallery now under construction, fully confirm my opinion in regard to the advantages of this method of development and extent of the supply (my estimates of which, however, are more conservative than those of some other engineers), as well as quality of the same, and lead me to renew my recommendation to adopt and extend this plan as far as practicable.

Of the nine stations referred to in the previous report, the Wantagh Station is now under contract and plans and specifications are nearly completed for the stations at Watts Pond and Massapequa.

As a matter of interest in connection with the construction of these infiltration galleries, measurements were continued of the velocity of the underground flow by the electrical method devised by Profesor Slichter and described in my last annual report. I had reason to believe that some published estimates in regard to the velocity of the underground flow in our watershed were much too low and this view has been fully confirmed by the experiments reported in my last annual report and those subsequently made. In the latter, the determination of the rate of flow in two wells, where the bottom of the strainer was 54 feet below the surface, showed a velocity of 109 feet per day. Following this result, wells were driven to the clay bed in the location chosen north of the Seaford railroad station. These wells had a strainer every ten feet and driving was continued until the clay bed was reached, at a depth of 62 feet. The determination of flow at depths of 55 feet, 41 feet and 26½ feet below the surface, showed a constant rate of 36 feet per day. At 12½ feet below the surface the rate was 37 feet per day, these rates being obtained immediately following a rainfall of 1.7 inches. It is interesting to note that the extreme velocity was evidently confined within extremely narrow limits, as a well 55½ feet below the surface showed 36 feet per day, while the well 54 feet below the surface showed 109 feet per day, the ground being at about the same elevation. It would seem probable that this high rate of flow was through a bed of gravel. A recording ammeter has been purchased and these tests of the rate of underground flow will be continued as soon as the other work permits.

I owe, and cheerfully render here, willing testimony to the valuable co-operation of Professor Slichter, of the United States Geological Survey, in making these measurements. We not only obtained from him last year valuable information in regard to his experiments and manipulation of his instruments, but aid in purchasing the same, valuable suggestions in regard to our work, and, lastly, the loan for our experiments of some of the instruments that he had and which it would have taken us some time to procure. Mr. Slichter's measurements confirm those made by us of the velocities of the underground flow, as well as our statement that the velocity is much higher than had been assumed in some cases. Thus, in one of his communications to me on the subject, dated August 10, Mr. Slichter states: "I have found the velocity of ground waters at location by you proposed for the Wantagh Infiltration Gallery to be 90 feet per day at a depth of 16 feet below the water table. This is immediately below the Pond."

In another communication, dated August 23, Professor Slichter, after stating that he wished to convey his thanks for the hearty co-operation uniformly received from this Bureau in his work and assistance afforded by us, adds: "You will be pleased to note that Agawam increased the natural velocity of ground water from 6 feet per day to only 12 feet per day after twelve hours pumping. To my mind, the possibilities of more water at Agawam are made exceedingly bright. The measurements were made about 500 feet from the line of wells."

It may be well to add that, while these determinations for the velocity of the underground flow are interesting, we have at our command other data of much greater practical value in determining the amount of the available underground supply at our proposed stations.

While the supply to be obtained from these Infiltration Galleries has been duly considered from a sanitary point of view before recommending their adoption, as shown by the reports of last year, already quoted, the matter again came up for consideration, at the request of the Comptroller, when the maps of land required for the Wantagh Infiltration Gallery were submitted to the Board of Estimate, it being then deemed advisable by the Chief of the Finance Department of the City to have a further report from the Board of Health as regards the sanitary condition of the expected supply and from the Commission on Additional Water Supply as regards the proposed locations. By your direction, therefore, I accompanied Hon. E. J. Lederle, Ph. D., President of the Board of Health, on an inspection of the sites of the three proposed Infiltration Galleries first to be constructed, i. e., at Wantagh, Massapequa and Watts Pond, and submitted to you a supplementary report, dated July 14, 1903, on these Infiltration Galleries, to which I append another report prepared, under my direction, by Mr. Whipple, the Biologist of our Mount Prospect Laboratory, summarizing the results of experiments which we had already made during the study of this question. The report to you of the President of the Board of Health can be given in its entirety and reads as follows:

"City of New York, Department of Health,
Office of the Commissioner of Health,
New York, July 14, 1903.

"Hon ROBERT GRIER MONROE, Commissioner of Water Supply Gas and Electricity:

"Dear Sir—In company with I. M. de Varona, Chief Engineer, Department of Water Supply, Borough of Brooklyn, I made an examination on July 10 of the sites of the three proposed infiltration galleries for the Borough of Brooklyn, namely,

at Wantagh, Massapequa and Watts Pond, and a careful study of the places for their construction.

"In my opinion, there can be no objection from a sanitary point of view to the contemplated improvements.

"Respectfully,
"ERNST J. LEDERLE, President."

The following are extracts from my supplementary report to you:

"In my report for the quarter ending June 30, 1902, already referred to, I gave some figures, as reported in the Edinburgh Medical Journal for 1899, to show the rapid decrease in the number of bacteria in the soil as we proceed from the surface downwards. The figures were as follows:

At the surface	1,680,000
Two feet below	900,000
Four feet below	25,000
Six feet below	410

"I also stated that 'in our watershed there is practically no difference in the water from wells above the blue clay differing 20 feet or more in depth. The line of division, as far as our analyses show, lies, as might be expected, between the wells above and those below the blue clay.'

"Although these facts left no doubt as to the effect of the soil layers in destroying the pathogenic bacteria, and although the efficiency of the filtration of water through a few feet of sand and gravel properly graded is no longer questioned, I deemed it advisable to have several tests made along the lines of our proposed infiltration galleries in order to determine the number of bacteria at varying depths in the ground. These tests were made under the immediate direction of Mr. G. C. Whipple, biologist of our Mt. Prospect Laboratory, and the details and results of the same were filed and are on record in our office, and were taken into consideration in locating the infiltration galleries under discussion. These tests included one near a side track of the Long Island Railroad, at a point where loads of manure were often piled. In the latter case, with 360,000 bacteria at the surface, there were none at a depth of 15 feet, and the various samples taken at a depth of 5 feet, 9 feet and 20 feet gave negative results for B. coli. Our infiltration gallery at that point has a depth of about 20 feet. The results of the other tests are not less interesting. While at the surface the number of bacteria ranges from 136,000 per c.c. to 354,000, they rapidly decrease as we proceed downwards, and at a depth of 6 feet few or none are to be found. I append hereto report, prepared by Mr. Whipple, at my request, summarizing the results of these tests, to which I beg to refer for further details in regard to the same.

"When I first recommended the adoption of the infiltration galleries for the utilization of the underground water, in preference to other methods hitherto adopted or suggested, the sanitary aspects of the question received due consideration, and from a careful study of the subject I then reached the conclusion that the water from these infiltration galleries could be equaled only by that from our driven wells, and that it would be safer than any other supplied to Greater New York. Whatever diffidence I might feel as to the soundness of my own conclusions must be removed by the endorsement of the plan both by the Commissioner of Health and by the Commission on Additional Water Supply."

Mr. Whipple's report, after referring to the location of the Infiltration Galleries under consideration, states as follows:

Samples of sand have been examined from several places along the line and at a point near the Bellmore Station, and bacterial tests have been made to determine the number of bacteria at different depths in the ground. These samples were collected near a side track of the Long Island Railroad, where cars were often loaded with manure. At this point it was found that the sand at the surface contained 360,000 bacteria per gram; at a depth of 5 feet there were 2,040 per gram; at a depth of 9 feet there were 4,500; at a depth of 15 feet there were none; at a depth of 20 feet there were 120. All of these samples gave negative tests for bacillus coli. The infiltration gallery at this point has a depth of about 20 feet.

"Several samples of sand have been examined from along the line of this gallery, and several series of samples were collected near the Valley Stream Station of the Long Island Railroad, at different depths, between April 24 and May 5. These samples were examined bacteriologically, and the results are given in the following table:

Test Well at Valley Stream.

Depth in Feet.	April, 24, 1903.	April 25, 1903.	April 27, 1903.	April 28, 1903.	April 29, 1903.	May 4, 1903.	May 5, 1903.
0	136,130	353,700	200,000	173,700	164,400	156,300	142,400
0.5	115,790	175,600	182,000	81,580	77,500	19,700	40,600
1	6,800	111,700	17,400	28,700	5,750	4,900	3,300
2	2,850	35,870	5,800	8,950	1,150	2,200	2,000
3	885	6,780	3,160	3,040	1,600	100	880
4	380	1,900	2,240	2,100	260	50	520
5	60	730	160	210	160	0	0
6	0	830	110	160	broken	0	0
7	0	170	.....	.....	.....	.....	.....

These results indicate that below a depth of five feet the sand never contains more than a very small number of bacteria. Such tests for bacillus coli as were made gave negative results.

"These studies appear to corroborate the more extensive investigations which have been recently made in England, which show that water which is collected from beneath the surface of the ground at depths greater than six feet, and under such conditions that no water is collected which has not passed through a depth of soil equal to about six feet, may be considered as safe from the sanitary standpoint. The destructive influence of the upper layers of soil upon the pathogenic bacteria has been found by recent experiments to be very marked, and it is now considered that the chief danger and practically the only danger to a well water is from contamination from the surface of the ground where the water enters the well without passing through the upper strata of the soil. Comparisons of the chemical analyses with the bacteriological tests have shown in many cases that waters, which from the chemical standpoint were apparently unsatisfactory, were entirely free from sewage bacteria. These statements are, of course, true only when the soil is of such a character as to act as an effective filtering medium. They may not be true in regions where there was a clay soil where the cracks allow contaminated water from the surface to pass to the wells.

"The conditions on Long Island are such that almost any water collected by driven wells or by use of such an infiltration gallery as that proposed may be considered as safe when the depth is as great as six feet. This limit of six feet is not such an arbitrary limit as might be supposed. An English authority states that the reason why he recommends this depth is because it is the practical limit to which earth worms bore and to which roots and trees extend.

"If all pollution along the line is removed to a distance of two or three rods there would be practically no danger that the water supply would become infected. As a precautionary measure it would be, of course, desirable to remove the source of pollution to as great a distance as financial considerations will allow."

The thoroughness of the investigations from a sanitary point of view is thus apparent, and the conclusions derived therefrom have been still further confirmed by the observations taken of the pollution of the ground water at the Italian camp at Elmont, to which reference has already been made.

Additional Stations Within the Borough Limits.

The main cost of the water furnished by the Ridgewood system is due to pumping, some of the water being pumped three or four times. An elimination of all but one pumping by the stations situated within the borough limits makes the cost of water furnished by these stations comparatively low. The cost of water delivered into the distribution mains was $27.16 per million gallons for the New Utrecht Station (in 1901), $18.66 for the Gravesend Station (in 1900) and $26.87 for the New Lots Station (in 1901), the New Lots Station being the only one where the pumping exceeded an average of 3,000,000 gallons daily. This cost includes interest and sinking fund on the investment. The corresponding cost of the Ridgewood water was about $48 per million gallons (in 1901).

It has already been shown that no contamination need be feared where water is taken a few feet below the surface, so that it would be safe and might be economical to establish within the borough limits at least one and possibly two additional stations, drawing from the underground supply. The cost of the lands required would be high, but even if it be estimated at $200,000, and buildings and machinery at $125,000, the cost per million gallons, delivered, would be about $27.70, assuming a daily delivery of 3,000,000 gallons. These figures are based on a short period of life of the station, in view of its location.

This station could be operated until the growth of the borough would so reduce the amount of rainfall reaching the underground water table that it would not be economical to continue pumping.

The water from these stations should be clear and have a lower temperature than the Ridgewood water. Should it be required to shut down these stations for repairs, or any other cause, the district supplied from these could be provided for from the Ridgewood system by making suitable cross connections with the distribution system.

Ultimate Supply From the Existing Watershed.

Should the general plan prepared by this bureau, and outlined in former reports, for the ultimate development of the present watershed be carried out, the available supply therefrom will be sufficient to last for several years to come, certainly for a period long enough to allow the completion of the works for the supply of Greater New York, assuming a reasonable rate of speed in their construction, or to secure an additional supply from Suffolk County, if such a course be decided upon. No computations or estimates are deemed necessary here, because unknown and changeable factors enter into this question and because the Commission on Additional Water Supply will no doubt report fully thereon.

Work for Commission on Additional Water Supply.

This Bureau has spared no effort to co-operate as far as possible with the Commission on Additional Water Supply in the work of the latter whenever it has been requested to do so.

Reference has already been made to the large amount of work done for the Commission in the Laboratory, and which has been given precedence over our own work, regardless of delay, loss or inconvenience. The Commission has also been furnished, from time to time, as requested, with the complete records of our Pumping Stations, giving in detail the fullest information, cost of pumping at the various stations, classifying all entering factors, levels of waters in our test wells, rainfall and meteorological tables, elevation of the waters in the large number of test wells driven in the past and recently established in connection with the study of our infiltration galleries, water contours prepared therefrom, bench marks, maps of the watershed, streams and lands, gaugings of our streams, plans and specifications of work prepared and to be contracted for, materials and well points for driving additional test wells, hook gauges, etc. At the Commissioner's request, we also ran two of our Driven Well Stations in order to facilitate their experiments.

With the reduced force at our command and the extraordinary amount of work in hand, it has been impracticable to always make copies of the numerous data asked for, but in such cases the information was given to the representatives of the Commission as called for. As some of the records had not been used for several years, considerable time and labor have been required in many instances to collect the desired information.

At the request of the Commissioner, I had several interviews with Mr. W. J. Sando, who has had charge of the work relating to pumping stations and pumping machinery with the Commission on Additional Water Supply, in order to discuss the consolidation of our pumping stations, recommended by me for some years past, and the pumping plants to be established at Gravesend and at the Infiltration Galleries. It is gratifying to add that Mr. Sando thoroughly endorsed the proposed plans of consolidation, the great advantages of which are apparent, and made some suggestions as regards the pumping plant to be installed at the Infiltration Galleries, which may be adopted in preparing the specifications for the stations at Watts and Massapequa, it having been found unadvisable to make any changes in the contract already awarded for the Wantagh Infiltration Gallery. Mr. Sando also made some suggestions in regard to the pumping engines and plant for Gravesend, which will be embodied in the specifications for that work. In connection with his work for the Commission on Additional Water Supply Mr. Sando asked for and received full information on and complete and detailed data in regard to the working of all our pumping stations, cost of operation, etc., and, furthermore, was afforded all facilities to personally visit these various stations.

Lawsuits for Alleged Diversion of Water.

Early in the year the Court of Appeals granted a new trial in the case of Frederick Reissert against the City for the diversion of water from under his farm, situated south of the Clear Stream Station. In this opinion the Court of Appeals held that the plaintiff could recover for the damage to rental and fee value of his land by the trespass of the City, and that testimony should be received in regard to the quantity of produce raised on the farm and the price received for the same, but that this should only be pertinent as related to the rental value of the farm. The new trial was granted on the errors of the Trial Judge excluding such testimony. The new trial clearly established an important principle, i. e., that no recovery could be made for profits as such, and that owners of farms were not entitled to continue to plant farms with produce which previous experience had shown would not reach maturity with the stations in operation, and could not recover for lost profits resulting therefrom.

During the year complete topographical surveys have been made of six farms and the elevations of water under the farms taken by means of borings. Six cases have been brought to trial, requiring the attendance of employees from this Bureau. While this may at least in some cases have been unavoidable, it has, nevertheless, interfered considerably with the regular work of the Bureau.

Meter Testing Apparatus.

Work was begun by this Bureau on plans for a meter testing apparatus, to be installed at the North Portland avenue yard, the existing one being fitted for the testing of only the smallest size meters, but having ascertained that plans and specifications for such apparatus had been prepared by your orders, outside of the Department, and that bids had actually been advertised, I deferred further action in the matter, although the investigations already made indicated that a suitable meter-testing apparatus could be installed without encroaching appreciably on the already limited floor space at the yard.

Tables.

The following tables annexed hereto give in detailed form some important data in connection with the supply and distribution, i. e.:

Table No. 1—Monthly record of rainfall at Brooklyn and vicinity from 1894 to 1903.

Table No. 2—Monthly record of rainfall at Hempstead Storage Reservoir from 1894 to 1903.

Table No. 3—Daily record of rainfall for Brooklyn and vicinity during 1903.

Table No. 4.—Daily record of rainfall at Hempstead Storage Reservoir during 1903.

Table No. 5—Highest, lowest, monthly range of and average temperature (degrees Fahrenheit) for ten years, between 8 and 9 o'clock a. m., at Hempstead Storage Reservoir.

Table No. 6—Summary of average daily consumption for each month for each system, 1903.

Table No. 7—Average daily consumption of Ridgewood water, U. S. gallons.

Table No. 8—Average, maximum and minimum daily consumption of water during 1903.

Table No. 9—Ratio of the average daily consumption for each month to that for the year from 1894 to 1903.

Additional Tables.

In connection with the annual report one hundred and forty (140) additional tables are prepared for office records, showing the cost of repairs to engines, boilers, buildings, driven wells at the various stations, water mains laid, gates and hydrants set to December 31, 1903, the details of the work done at each of the pumping stations, giving the amount of water pumped, coal used, cost of pumping for the year, cost of pumping per foot million gallons, with subdivision of expenses due to cost of coal, salaries and supplies and interest and sinking fund charges, etc. These tables were formerly published, but have not been published since 1897, and are now kept in our permanent record book on file in this office.

Records and Accounts.

With the large amount of contract work and the necessary utilization thereby of the time of the old employees, it has been impossible to keep our records up to date. Provision has been made for permanently preserving the annual reports and tables which are not now published, as was previously the case up to 1897. These tables and reports are of great value to the Bureau, both in the presecution of its ordinary work and that of improvement, and in preparing the many special reports and tables which are frequently required both by this Department and by the Law Department.

Salaries of Office Force.

I have in repeated verbal and written communications called your attention during the past two years to the inadequate compensation received by the Assistant Engineers, Transitmen, Levellers, Rodmen and other Employees of this Bureau, whose salaries are out of all proportion to the value of the services rendered in some cases, generally far below the figures paid to employees in the same positions in other bureaus in Greater New York, and occasionally even below the minimum figures prescribed under the Civil Service regulations. Both the Commissioner and you have recognized the justice of the increases in salaries recommended by me, but while some of these increases have been made, at least partially, I regret to add that in many cases no action has yet been taken. No other municipal employees have worked more earnestly, faithfully and efficiently than those of this Bureau, above referred to, and I therefore earnestly hope and trust, both in the interest of the City and in strict justice to them, that the salaries of these men may be speedily readjusted on a more equitable basis.

Yours very truly,

I. M. DE VARONA, Chief Engineer.

Table No. 1—Monthly Record of Rainfall at Brooklyn and Vicinity from 1894 to 1903.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1894†	1.67	4.21	3.08	2.23	2.70	2.51	1.70	1.78	7.02	3.36	5.06	5.10	40.42
1895*	4.91	0.76	2.96	3.30	2.09	2.77	4.65	3.88	1.25	4.56	3.45	1.90	36.48
1896*	0.98	5.85	5.61	1.40	2.19	6.24	5.29	2.05	3.91	1.73	2.70	1.56	39.51
1897*	3.16	2.67	2.53	3.10	6.04	2.68	10.00	3.37	1.55	0.94	4.88	4.64	45.56
1898*	3.96	4.73	2.98	3.24	6.03	1.57	4.82	3.41	2.02	5.75	6.52	2.93	47.96
1899*	3.73	3.74	6.13	1.65	1.14	2.34	7.08	4.48	6.13	2.07	1.64	1.98	42.11
1900*	4.00	5.33	3.74	1.88	4.66	3.07	5.14	2.33	3.05	3.42	4.58	1.91	43.11
1901*	2.16	0.55	4.22	6.33	7.03	0.99	7.16	6.27	2.16	3.03	1.18	6.90	47.98
1902*	2.50	6.02	4.31	3.39	1.20	5.87	2.69	3.68	4.19	6.49	1.69	6.44	48.47
1903*	3.64	3.84	4.18	3.19	0.44	8.76	3.46	6.36	2.77	12.02	1.07	2.76	52.49

†Record taken Adelphi Academy, Brooklyn. *Record taken Municipal Building, Brooklyn.

Table No. 2—Monthly Record of Rainfall at Hempstead Storage Reservoir, from 1894 to 1903.

Year.	Jan.	Feb.	March.	April.	May.	June.	July	August.	Sept.	Oct.	Nov.	Dec.	Total.
1894	2.09	3.30	1.87	2.14	5.42	0.59	0.81	0.56	4.89	7.12	3.33	4.76	36.88
1895	5.08	0.65	3.18	3.45	2.29	1.05	5.37	3.79	1.73	3.37	3.49	2.19	35.64
1896	1.10	7.04	4.62	1.42	3.04	5.90	3.25	3.29	3.55	1.76	2.91	0.94	38.82
1897	2.27	2.74	3.11	3.33	4.64	3.17	11.68	2.62	1.51	1.51	5.00	4.83	46.41
1898	4.13	3.23	3.45	3.79	8.99	0.77	5.43	4.83	2.44	5.81	6.00	2.36	51.22
1899	4.22	5.02	7.79	1.47	1.79	2.21	5.07	3.59	5.17	2.76	2.69	1.82	43.60
1900	4.45	5.04	3.77	1.87	4.11	1.98	4.69	3.76	2.10	3.22	4.16	2.28	41.43
1901	2.21	0.77	6.97	8.05	7.17	0.55	5.93	4.03	3.36	1.95	1.28	7.65	49.92
1902	2.17	4.99	5.01	3.62	1.01	6.03	2.42	3.34	5.54	8.68	2.13	7.04	51.98
1903	3.82	4.65	5.21	3.98	0.40	9.58	3.16	7.67	2.05	6.65	1.54	3.43	52.14

Table No. 3—Daily Record of Rainfall in Brooklyn and Vicinity During 1903.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	....	....	....	....	....	....	....	....	....	....	....	....	....
2	0.07	....	....	0.03	....	....	0.15	....	....	0.53	....	0.08	0.86
3	1.26	....	....	0.02	0.02	....	....	....	....	0.03	....	0.08	1.41
4	....	1.01	....	0.62	0.13	....	....	2.57	....	....	....	....	4.33
5	....	....	....	....	....	....	0.05	0.17	0.08	....	0.34	....	0.64
6	0.15	....	....	....	....	....	0.02	0.06	....	....	....	....	0.23
7	....	....	0.04	0.39	....	0.38	....	0.04	....	....	....	....	0.85
8	....	0.44	0.72	0.52	....	0.37	....	0.01	....	3.85	....	....	5.91
9	....	....	0.84	0.13	....	....	....	0.22	....	6.46	....	0.80	8.45
10	....	....	....	....	....	0.06	....	....	....	0.24	....	....	0.30
11	0.95	0.41	0.27	0.01	....	0.04	0.36	0.05	0.12	0.12	....	....	2.33
12	0.01	....	....	0.24	....	2.06	....	....	....	0.01	....	....	2.32
13	....	....	....	....	....	0.22	0.18	....	....	....	....	0.41	0.81
14	....	....	....	0.71	....	0.34	....	0.08	....	....	0.12	....	1.25
15	....	0.70	....	0.51	....	0.39	....	....	....	....	....	....	1.60
16	....	0.30	....	0.01	....	....	....	....	1.20	....	0.12	....	1.63
17	....	....	....	....	....	....	....	....	0.60	0.65	0.44	....	1.69
18	....	....	....	....	....	0.25	1.30	....	0.02	0.01	....	....	1.58
19	....	....	....	....	....	0.14	....	0.06	....	....	....	....	0.20
20	....	....	....	....	0.17	0.18	0.01	0.15	....	....	....	1.10	1.61
21	0.59	....	....	....	....	0.20	....	....	....	....	....	....	0.79
22	....	....	1.70	....	0.10	0.03	0.69	0.11	....	....	0.03	0.03	2.69
23	....	....	....	....	....	0.70	....	....	....	0.12	0.02	....	0.84
24	0.05	....	....	....	....	0.45	....	0.05	....	....	....	....	0.55
25	0.12	....	....	....	....	....	....	0.30	....	....	....	0.10	0.52
26	....	....	....	....	....	....	0.05	....	....	....	....	0.05	0.10
27	....	0.33	....	....	....	....	....	0.01	0.75	....	....	....	1.09
28	0.31	0.65	0.01	....	0.02	....	....	1.48	....	....	....	....	2.47
29	0.08	....	....	....	....	2.95	0.04	0.84	....	....	....	0.11	4.02
30	0.05	....	0.58	....	....	....	0.61	0.16	....	....	....	....	1.40
31	....	....	0.02	....	....	....	....	....	....	....	....	....	0.02
	3.64	3.84	4.18	3.19	0.44	8.76	3.46	6.36	2.77	12.02	1.07	2.76	52.49

Table No. 4—Daily Record of Rainfall at Hempstead Storage Reservoir During 1903.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	....	....	....	....	....	....	....	....	....	....	....	....	....
2	0.05	....	....	0.02	....	....	0.77	....	....	0.28	....	....	1.12
3	1.19	....	....	0.07	....	....	0.04	....	....	0.04	....	0.26	1.60
4	0.07	1.49	....	0.45	0.03	....	....	3.17	....	....	....	....	5.21
5	....	....	....	....	....	....	0.01	0.75	0.04	....	0.73	....	1.53
6	0.14	....	....	....	....	....	0.10	0.27	....	....	....	....	0.51
7	....	....	0.16	0.37	....	0.98	....	0.23	....	....	....	....	1.74
8	....	0.48	2.01	0.68	....	0.43	....	....	....	0.54	....	....	4.14
9	....	....	1.00	0.16	....	0.02	....	0.06	....	3.79	....	0.78	5.81
10	....	....	0.01	....	....	0.02	....	....	....	0.19	....	....	0.22
11	0.99	0.37	0.30	....	....	0.11	0.20	0.31	....	0.03	....	....	2.31
12	....	....	....	0.16	....	2.13	0.12	....	....	0.05	0.01	....	2.47
13	....	....	....	....	....	0.16	0.25	....	....	....	....	0.38	0.79
14	....	....	....	1.24	....	0.73	0.02	0.14	....	....	0.15	....	2.28
15	....	0.09	....	0.82	....	0.68	....	....	....	....	....	....	1.59
16	....	0.47	....	0.01	....	....	....	....	0.66	....	0.13	....	1.27
17	....	0.75	....	....	....	....	....	....	0.46	1.73	0.44	....	3.38
18	....	....	....	....	....	0.18	1.19	....	0.03	....	0.01	....	1.41
19	....	....	....	....	....	0.28	0.09	....	....	....	....	....	0.37
20	....	....	....	....	0.30	0.32	....	0.09	....	....	....	1.55	2.26
21	0.73	....	0.15	....	....	0.18	....	....	....	....	....	....	1.11
22	....	....	0.50	....	0.05	0.07	0.11	0.03	....	....	0.03	0.04	0.83
23	....	....	0.68	....	....	0.72	....	0.02	....	....	0.04	....	1.46
24	....	....	....	....	0.02	0.39	....	0.05	....	....	....	....	0.46
25	0.15	....	....	....	....	....	....	0.40	....	....	....	0.22	0.77
26	....	....	....	....	....	....	....	....	....	....	....	0.02	0.02
27	....	0.32	....	....	....	....	....	0.02	0.86	....	....	0.02	1.22
28	0.26	0.68	0.02	....	....	....	....	1.31	....	....	....	....	2.27
29	....	....	....	....	....	2.14	0.02	0.64	....	....	....	0.16	2.96
30	....	....	0.37	....	....	0.04	0.23	0.18	....	....	....	....	0.82
31	0.19	....	0.01	....	....	....	0.01	....	....	....	....	....	0.21
	3.82	4.65	5.21	3.98	0.40	9.58	3.16	7.67	2.05	6.65	1.54	3.43	52.14

Table No. 5—Highest, lowest, monthly range of and average temperature (degrees Fahrenheit) for ten years, between 8 and 9 o'clock a. m., at Hempstead Storage Reservoir.

Year.	January.				February.				March.				April.			
	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Range.	Average.
1894	46	20	26	32	46	7	39	28	57	25	32	40	60	35	25	47
1895	48	12	36	29	37	4	41	18	40	18	22	32	59	32	27	44
1896	38	..	38	23	47	1	48	27	43	17	26	29	70	28	42	47
1897	44	8	36	25	40	8	32	27	49	19	30	35	58	28	30	45
1898	49	2	47	29	42	4	38	28	55	26	29	40	56	30	26	45
1899	47	3	44	26	42	5	47	23	47	24	23	36	63	32	31	46
1900	54	12	42	29	51	5	46	27	45	16	29	31	60	30	30	47
1901	40	5	35	29	35	11	24	21	52	12	40	35	54	39	15	46
1902	41	14	27	25	44	11	33	25	52	25	27	40	60	38	22	48
1903	48	10	38	27	49	2	47	28	52	29	23	43	64	32	32	49
Average....	46	9	37	27	43	6	39	25	49	21	28	36	60	32	28	46

Year.	May				June.				July.				August.			
	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Range.	Average.	Highest.	Range.	Lowest.	Average.	Highest.	Lowest.	Range.	Average.
1894	76	48	28	61	83	55	28	70	82	63	19	74	78	60	18	69
1895	79	44	35	55	80	59	21	67	76	58	18	64	76	59	17	69
1896	77	46	31	61	76	55	21	64	84	64	20	72	80	59	21	69
1897	68	48	20	56	72	52	20	62	76	62	14	70	75	61	14	68
1898	68	44	24	56	75	57	18	67	80	60	20	72	79	63	16	71
1899	72	52	20	59	85	63	22	70	80	65	15	71	77	63	14	69
1900	72	43	29	58	80	59	21	69	85	61	24	74	84	65	19	74
1901	70	40	30	57	87	55	32	70	94	64	30	75	78	67	11	73
1902	70	45	25	59	76	62	14	67	81	62	19	71	77	64	13	71
1903	75	45	30	60	74	56	18	63	84	65	19	74	49	10	38	26
Average....	73	45	27	58	79	57	21	67	82	58	19	72	49	9	40	31

Year.	September.				October.				November.				December.			
	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Range.	Average.	Highest.	Lowest.	Range.	Average.
1894	76	51	25	66	63	40	23	54	60	27	33	41	48	8	40	34
1895	77	48	29	65	60	34	26	45	58	24	34	42	52	17	35	32
1896	71	45	26	61	61	35	26	45	58	28	30	44	46	5	41	27
1897	75	45	30	61	66	32	34	50	60	21	39	41	49	10	39	31
1898	78	53	25	65	71	40	31	55	56	23	33	39	48	8	40	31
1899	73	48	25	63	67	38	29	55	62	25	37	41	56	8	48	33
1900	79	52	27	68	69	42	27	57	65	22	43	45	46	12	34	30
1901	77	55	22	66	66	43	23	54	55	20	35	37	53	10	43	31
1902	73	53	20	65	66	40	26	56	50	30	30	48	48	8	40	29
1903	74	44	30	62	68	42	26	54	52	16	36	36	49	10	38	26
Average....	75	49	26	65	66	39	28	52	59	24	35	41	49	9	40	31

Year.

Year.	Highest.	Lowest.	Range.	Average.
1894	83	7	76	51
1895	80	4	84	47
1896	84	1	85	47
1897	76	8	68	48
1898	80	2	78	50
1899	85	5	90	49
1900	85	5	80	51
1901	94	5	89	50
1902	81	8	73	58
1903	84	6	78	50
1904	83	5	78	50

Table No. 5—Highest, lowest, monthly range of and average temperature (degrees Fahrenheit) for ten years, between 8 and 9 o'clock a. m., at Hempstead Storage Reservoir.

Year.	Highest.	Lowest.	Range.	Average.
1894	83	7	76	51
1895	80	4	84	47
1896	84	1	85	47
1897	76	8	68	48
1898	80	2	78	50
1899	85	5	90	49
1900	85	5	80	51
1901	94	5	89	50
1902	81	8	73	58

Table No. 6—Summary of average daily consumption for each month for each system, 1903.

Month.	Ridgewood Low Service.	Mt. Prospect Low Service.	Mt. Prospect High Service.	Total Ridgewood System.	Gravesend System.	New Utrecht System.	New Lots System.	Total Supply.
January	90,224,592	5,476,010	3,522,161	99,222,763	2,794,287	1,386,425	4,425,429	107,828,904
February	91,372,330	5,256,307	3,490,965	100,119,602	2,760,521	1,374,414	4,334,486	108,589,023
March	88,949,345	4,937,090	3,411,742	97,298,177	2,449,345	1,432,148	3,881,059	105,100,729
April	87,174,762	4,890,350	3,317,233	95,382,345	2,437,910	1,386,316	3,818,900	103,025,471
May	87,669,292	5,267,619	3,362,903	96,299,815	2,691,081	1,408,412	4,354,171	104,753,479
June	85,922,580	4,659,550	3,361,366	93,943,496	3,064,827	355,840	3,326,387	100,690,550
July	89,911,876	5,208,703	2,952,193	98,072,772	3,328,077	.....	3,758,168	105,159,017
August	86,166,124	4,901,768	2,847,419	93,915,311	2,946,610	1,560,509	3,586,581	102,009,011
September	90,896,138	5,728,630	3,066,700	99,691,468	2,909,703	1,895,630	3,617,533	108,114,334
October	85,668,681	6,843,974	3,080,355	95,593,010	2,817,100	1,856,594	3,425,113	103,691,807
November	81,613,713	6,946,467	3,155,567	91,715,747	2,740,390	1,835,147	3,326,016	99,617,300
December	90,002,895	6,927,458	3,242,387	100,172,740	2,759,819	1,884,516	3,701,129	108,518,204
Average	87,953,474	5,590,049	3,232,238	96,775,761	2,813,166	1,363,693	3,794,827	104,747,447

Table No. 7—Average daily consumption of Ridgewood water (U. S. gallons)..

Months.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.
January	69,946,220	73,367,888	82,516,377	85,598,346	90,114,924	93,831,637	87,555,887	88,749,137	94,406,078	99,222,763
February	71,929,129	81,659,186	82,536,222	84,729,715	91,029,431	99,711,422	89,483,339	84,576,225	95,333,109	100,119,602
March	70,295,789	75,247,888	81,633,514	84,182,237	88,225,399	92,285,112	90,013,553	83,261,957	91,802,147	97,298,177
April	68,960,846	72,009,810	79,298,604	84,801,950	86,806,161	91,051,505	87,470,091	85,792,043	92,107,840	95,382,345
May	71,828,920	72,988,120	79,115,677	83,918,532	87,729,996	93,234,382	87,817,585	86,790,207	93,238,318	96,299,815
June	74,359,395	75,946,417	78,987,723	87,226,678	91,825,462	95,276,994	91,228,694	92,679,608	93,998,638	93,943,496
July	75,555,189	74,938,034	80,042,254	88,341,503	90,672,468	93,357,913	90,612,607	91,808,950	91,493,498	98,072,772
August	73,364,030	76,503,050	81,298,990	88,466,299	91,311,761	92,890,074	89,699,781	88,518,807	89,675,771	93,915,311
September	71,075,515	79,928,525	81,665,546	92,010,672	93,921,152	92,532,692	86,099,926	88,174,110	91,894,767	99,691,468
October	70,232,426	77,616,064	80,727,534	90,516,207	90,556,498	90,400,529	79,762,109	88,993,542	91,264,237	95,593,010
November	69,785,866	73,544,936	80,073,208	86,585,173	87,781,395	87,174,542	78,508,598	87,012,777	88,536,153	91,715,747
December	69,002,028	75,594,929	83,616,541	86,661,495	90,777,488	86,455,900	85,411,711	89,697,757	93,527,553	100,172,740
Averages	71,360,074	75,735,022	80,961,149	86,929,834	90,054,503	92,298,942	86,963,899	88,020,881	92,255,026	96,775,761
Number of taps in use January 1	98,990	101,166	103,322	105,273	107,649	109,651	111,757	113,708	115,934	117,841
Number of taps in use January 1, 1904										120,844

Table No. 8—Average, maximum and minimum daily consumption of water during 1903.

1903.	Average U. S. Gallons.	Maximum Date.	Maximum U. S. Gallons.	Minimum Date.	Minimum U. S. Gallons.
January	107,828,904	Tuesday, 13..	116,486,450	Sunday, 4..	99,010,450
February	108,589,023	Thursday, 19..	118,415,350	Sunday, 15..	99,163,750
March	105,100,729	Monday, 2..	111,735,550	Sunday, 22..	96,582,400
April	103,025,471	Tuesday, 28..	109,692,050	Sunday, 19..	95,691,950
May	104,753,479	Monday, 18..	112,228,850	Sunday, 31..	93,328,600
June	100,690,550	Wednesday, 3..	107,847,550	Sunday, 14..	92,710,550
July	105,159,017	Friday, 10..	109,767,600	Saturday, 4..	95,992,250
August	102,009,011	Tuesday, 25..	107,763,550	Sunday, 30..	92,518,400
September	108,114,334	Monday, 14..	114,790,750	Sunday, 6..	97,961,350
October	103,691,807	Thursday, 1..	113,315,450	Thursday, 8..	94,852,350
November	99,617,300	Monday, 30..	116,803,650	Sunday, 15..	91,812,450
December	108,518,204	Monday, 28..	120,796,400	Monday, 7..	*83,649,200
Average	104,747,447				

* This low consumption was due to the fact that delivery mains were shut off on account of repairs at the reservoir.

Table No. 9—Ratio of the average daily consumption for each month to that for the year from 1894 to 1903.

Months.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.
January	0.97	0.97	1.02	0.98	0.99	1.01	1.00	1.01	1.01	1.03
February	1.01	1.07	1.01	0.97	1.00	1.07	1.02	0.97	1.03	1.04
March	0.98	0.99	1.00	0.96	0.97	0.99	1.02	0.95	0.99	1.01
April	0.97	0.95	0.97	0.97	0.96	0.98	1.00	0.97	0.99	0.99
May	1.00	0.96	0.98	0.97	0.97	1.01	1.00	0.98	1.01	1.00
June	1.04	1.00	0.98	1.01	1.03	1.04	1.04	1.05	1.02	0.96
July	1.06	0.99	1.00	1.02	1.02	1.02	1.04	1.05	0.99	1.01
August	1.03	1.01	1.01	1.03	1.03	1.01	1.03	1.01	0.97	0.98
September	1.00	1.06	1.01	1.06	1.06	1.01	0.99	1.00	1.00	1.04
October	0.98	1.02	0.99	1.04	1.01	0.98	0.93	1.01	0.98	0.99
November	0.98	0.97	0.98	0.99	0.96	0.94	0.91	0.99	0.96	0.95
December	0.97	0.99	1.03	0.99	1.00	0.94	0.99	1.01	1.02	1.04

City of New York, Borough of Brooklyn,
Department of Water Supply, Gas and Electricity,
Bureau of Distribution and Repairs, Municipal Building, Room 47.
Brooklyn, December 17, 1903.

Hon. ROBERT VAN IDERSTINE, Deputy Commissioner of Water Supply, Gas and Electricity, Borough of Brooklyn:

Dear Sir—I respectfully submit herewith report of the work of the Bureau of Distribution and Repairs for eleven (11) months (Jan. 1st to Nov. 30) of the year 1903.

The Repair Yards have been kept in good order, the discipline of the force has been excellent, and the men have done very hard and good work.

We have been very fortunate in not having any serious trouble with the 48-inch water main on Atlantic avenue, owing to the settlement of the same about 200 feet east of Rockaway avenue; the pipe settled about 28 inches, and we were successful in raising the same without any damage whatever to the open cut, which came within three feet of the pipe, and without cutting off the supply.

On East New York avenue about 200 feet east of Utica avenue the street was washed out, and the 48-inch water main was undermined by the heavy rains of October; about 150 feet of said pipe was exposed and sagged considerably; the work of raising the same was done by my own men, and in a satisfactory manner. Our prompt work prevented serious damage.

There was also a washout on the 16-inch water main on Eighty-sixth street and Thirteenth avenue, for about 100 feet; the main was sagged about 14 inches from its original level; the work of raising the pipe and recalking all the joints was done by my men in this case also.

The following is some of the particular work which we have at present underway, and which I expect to have finished by the latter part of December, provided the weather continues fair:

The removal of the 36-inch gate on Atlantic avenue, near Clinton avenue, and the replacing of the same with a new one. The pressure on the southern side of the city will be somewhat reduced for about 24 hours when this work is being done.

The alteration of the 12-inch water main on Atlantic avenue, near Franklin avenue.

The moving of 6,000 feet of 8-inch pipe, together with all the cross connections, to allow the contractor more room for his 48-inch pipe on Atlantic avenue, between Essex street and Manhattan crossing.

The grading of streets in several parts of the city has made it necessary to lower our distribution mains, particularly the 16-inch force main going from New Lots station to the reservoir; the same will have to be lowered 4 feet. Considerable other work of this character is also underway at present.

I am gratified with the prompt action of the Department in meeting many very difficult pieces of work, and I gladly give praise to the force under my charge.

The fire at the Academy of Music urges me to again call your attention to the necessity of taking up the old mains. The pipe in Montague street was one of the old mains, and was included in my report some years ago.

Respectfully yours,
HENRY HAWKES, Superintendent of Repairs.

Annual Report—1903.
(January 1 to November 30.)

New fire hydrants set as addition to service	62
New fire hydrants set to replace old ones	114
Good fire hydrants set to replace old ones	384
Fire hydrants repaired	5,367
New drinking hydrants set	7
Drinking hydrants repaired	73
New water gates set	67
New water gates set to replace old ones	51
New water meters tested	1,702
Repaired water meters tested	415
New branches cut in	100
Leaks in services	583
Premises cut off on account of leaks, non-payment of taxes, etc	139
Taps driven and inspected	2,782
Stop cocks repaired on distribution mains	823
Taps drawn and mains plugged	135
Leaks in distribution	465
Private main agreements signed	129

New water mains laid by Bureau of Distribution and Repairs—4-inch, 565 feet; 6-inch, 2,579 feet; 8-inch, 3,426 feet; 12-inch, 3,380 feet; total, 9,950 feet.

Water mains relaid by Bureau of Distribution and Repairs—6-inch, 225 feet; 12-inch, 70 feet; total, 295 feet.

Water mains lowered by Bureau of Distribution and Repairs—6-inch, 1,516 feet; 12-inch, 1 foot; 16-inch, 512 feet; private main, 1 foot 4 inches, 200 feet; total, 2,229 feet.

Western District Repair Yard.

Fire Hydrants, Repairs, Etc.—

New fire hydrants set	8
New fire hydrants set in place of old ones	69
Good fire hydrants set in place of old ones	254
Fire hydrants moved	47
Fire hydrants removed	13
Fire hydrants repaired temporarily	2
Fire hydrant joints recalked	14
Fire hydrant wastes plugged	7
Fire hydrant services repaired	1
Fire hydrant valves closed	500
Fire hydrants "blown off"	103
Fire hydrants salted	57
Fire hydrants pumped and salted	28
Fire hydrants thawed, pumped and salted	229
Fire hydrant chains repaired	20
Fire hydrant casings reset	5
Fire hydrants cleaned and oiled	945
Fire hydrant nozzles recalked	132
Fire hydrant stuffing boxes repacked	51
Fire hydrant gates on nozzles	7
New handles	64
New jam-nuts	38
New screws	49
New facings	39
New top-nuts	53
New tops	11
New casings	12
New caps	287
New chains	58
New sockets	98
New washers	3
New bolts	121
New nozzles	132
New slides	3
New wastes	4
New covers	2
New binders	3
New stuffing boxes	8
New latches	70
New valves	20
New bridges	3
New offsets	2
New hooks, bends, wedges, gaskets and rods	5

Drinking Hydrants, Repairs, Etc—

New drinking hydrants set	2
New drinking hydrants set to replace old ones	1
Good drinking hydrants set to replace old ones	8
Drinking hydrants moved	1
Drinking hydrants removed	5
Drinking hydrants turned on	2
Drinking hydrants shut off at stopcock	26
Drinking hydrants shut off at main	1
Drinking hydrant wastes cleared	1
Drinking hydrants reset	1
Drinking hydrants repaired	11
Drinking hydrants cleaned and oiled	1
New springs	15
New washers	46
New bolts	4
New nozzles	1
New handles	3
New stopcocks	1
New stopcock boxes	3
New service pipes	1
New rods	1
New tops	2

Leaks.

Service Pipes—

Shut off at main	63
Shut off at stopcock	8
Owners or agents notified	128
Left in charge of plumbers	45
Shut off gate on service	1
Shut off by plumber	1
Left in charge of contractor	1
Shut off by contractor	1
District shut for plumbers	2
New ⅜ taps driven	8
New ⅝ taps driven	7
New 1-inch taps driven	1
New taps for broken ones	6
Taps redriven	14
Services hammered	5
Taps drawn and services plugged	7
Couplings of taps tightened	2
New tap couplings	1
Services pumped out	1

Mains—

4-inch joints recaulked	1
6-inch joints recalked	41
8-inch joints recalked	15
12-inch joints recalked	40
20-inch joints recalked	13
36-inch joints recalked	1
48-inch joints recalked	24
6-inch mains repaired	7
8-inch mains repaired	1
30-inch mains repaired	1
20-inch mains shut off	1
2-inch pipe plugged	1

Gates—

New 6-inch gates set	7
New 8-inch gates set	5
New 6-inch gates set to replace broken ones	11
New 8-inch gates set to replace broken ones	2
6-inch gates repacked	12
8-inch gates repacked	1
12-inch gates repacked	4
6-inch gates cleaned and oiled	6
20-inch gates cleaned and oiled	7
30-inch gates cleaned and oiled	5
48-inch gates cleaned and oiled	3
Gates located	4
Gates moved	1
Gates opened	73
Gates closed	96
Gates tightened	8
Gate boxes set to grade	108
New gate boxes	9
New gate box covers	16
New necks	2
New screws	2
New bonnets	1
New top nuts	3

New Branches—

6 by 4	13	
8 by 4	14	
8 by 6	2	
12 by 4	4	
12 by 6	2	
20 by 4	1	
20 by 8	2	
30 by 12	1	
38 by 8	1	
		40
6 by 4 3-way	8	
6 by 6 3-way	2	
8 by 4 3-way	2	
		12

Special Work.

Water Mains Laid, Relaid and Lowered—

Laid 1,000 feet of 8-inch pipe on First street, Third to Fourth avenues.
Laid 432 feet of 6-inch pipe on Dyckman street.
Laid 12 feet of 6-inch pipe on John street, east of Jay.
Relaid 70 feet of 12-inch pipe on Joralemon street, between Henry street and Garden place.
Relaid 225 feet of 6-inch pipe at Franklin and Atlantic avenues.
Lowered 6 feet of 6-inch pipe on John street, east of Jay street.
Lowered 2 feet 4 inches of 16-inch pipe at Flatbush and Fifth avenues.
Lowered 1 foot of 12-inch pipe at Flatbush and Atlantic avenues.
Lowered 12-inch and 16-inch main, Ridgewood Reservoir.

Miscellaneous—

Streets repaved	93
Streets reflagged	67
Curbs reset	7
Patent sidewalks repaired	17
Pressures taken	32
Districts shut down for contractors	17
Districts shut down for plumbers	2
Districts shut down for Engineer's Bureau	1
Mains cut out	5
Water turned on	4
Flaggings repaired	3
⅝-inch taps shut off	4
⅜-inch taps drawn	1
Dangerous holes filled in	3
Cementings	2
Service pipes cleared	2
Braced and propped 48-inch mains	2
Filled in around hydrants	2
Cleaned up and leveled holes	2

Uncovered 48 by 30 4-way branch.
Took out 4-inch Gem meter.
Removed rock from trench.
Filled in 12-inch main.
Moved main for sewer.
Cut off fire service.
Cut out and plugged 4-inch branch.
Cut out 3-way branch.
Disconnected tap and blew out pipe.
Cut out 2-inch plug.
Shut district and put in 1¼-inch nipple and cap.
Cleaned horse trough.
Cut out 20 by 4 branch.
Plugged 6-inch main.
Cut out 12-inch branch.
Capped 12-inch branch.

Eastern District Repair Yard.

Fire Hydrants, Repairs, Etc.—

New fire hydrants set	3
New fire hydrants set, in place of broken ones	33
Good fire hydrants set, in place of broken ones	122
Fire hydrants thawed and pumped out	172
Fire hydrant valves closed	655
Fire hydrant pressures taken	7
Fire hydrant nozzles recalked	252
Fire hydrants cleaned and oiled	187
Fire hydrants repacked	44
Fire hydrants flushed	9
Fire hydrants set to grade	8
Fire hydrant service pipes repaired	15
Fire hydrants moved	6
Fire hydrant casings reset	8
Fire hydrant packing boxes calked	7
Abandoned fire hydrants cut out	3
Broken fire hydrants cut out	10
New sockets	108
New caps and chains	213
New nozzles	39
New packing boxes	14
New tops	38
New handles	65
New valves	23
New screws	50
New latches	39
New top nuts	79
New gaskets	16
New rods	3
New jam-nuts	130
New binders	7
New casings	8

Leaks.

Service Pipes—

Owners or agents notified	83
Shut off at main	37
Leaking service pipes plugged	5
Abandoned taps shut off at main	166
4-inch service pipes shut off and disconnected	2
4-inch service pipes repaired	2
Tap holes in mains plugged	8

Mains—

6-inch mains repaired	25	
8-inch mains repaired	3	
12-inch mains repaired	35	
20-inch mains repaired	1	
		64

Gates—

New gates set, 6-inch	3
New gates set in place of broken ones, 4-inch	2
New gates set in place of broken ones, 6-inch	4
Gates repaired, 6-inch	37
Gates repaired, 8-inch	8
Gates repaired, 12-inch	10
Gates repaired, 20-inch	2
Gates repaired, 4-inch	1
New gate boxes set	14
Gate boxes set to grade	69
New covers on gate boxes	6
Gates opened and closed	90

Branches—

New branches put in, 4 x 2	1	
New branches put in, 6 x 3	4	
New branches put in, 6 x 2	9	
New branches put in, 8 x 2	2	
New branches put in, 8 x 4	2	
New branches put in, 12 x 4	1	
New branches put in, 6 x 4	4	
New branches put in, 20 x 6	1	
		24
Branches cut out, 6 x 4		1

Special Work.

Water Mains Laid, Lowered, Cut Out, Etc.—

Laid 570 feet of new 6-inch main on North Eighth street, between Havemeyer street and Union avenue.

Laid 44 feet of new 4-inch main to reset fire hydrant at Grand street and Newtown Canal.

Lowered 70 feet of 6-inch main on Stewart street, between Bushwick and Evergreen avenues.

Cut out 65 feet of abandoned 8-inch main, capped ends of pipe and connected two streets at Broadway, Reid avenue and Pulaski street.

Miscellaneous—

Owners of leaking horse troughs notified	2
Leaking horse troughs shut off at stop cock	1
Sidewalks relaid around fire hydrants	78
Streets repaved over mains	116
Streets repaved around gate boxes	25
Dangerous holes in streets filled in over mains	6
Abandoned 8-inch mains cut out	2
Abandoned 6-inch mains cut out	1
Taps redriven in mains	6
Water turned on to private houses	2
Water turned on new mains	7
Water shut off for contractors	14
Stop cocks on sidewalks shut off	2
Branches in mains plugged	3
Service pipe lowered	1
6-inch main cut out to blow out pipe	1

East New York Repair Yard.

Fire Hydrants, Repairs, Etc.—

New fire hydrants set	26
Fire hydrants lowered to grade	17
Fire hydrants raised to grade	4
Fire hydrants moved	9
Fire hydrants taken out for repair	64
Fire hydrant nozzles recalked	125
Fire hydrant valves closed	136
Fire hydrant stuffing boxes repacked	55
Fire hydrants "blown off"	8
Fire hydrants cleaned and oiled	33
Fire hydrant joints recalked	5
Fire hydrants thawed and pumped out	102
New valves	16
New screws	55
New sockets	34
New casings	2
New tops	6
New nozzles	69
New jam-nuts	26
New "T" handles	42
New covers	42
New latches	28
New caps and chains	139

Leaks.

Service Pipes—

Owners or agents notified	56
Taken charge of by plumbers	8
Shut off at main	66
New taps redriven	19

Mains—

Joints recalked, 6-inch	12	
Joints recalved, 8-inch	164	
Joints recalked, 12-inch	8	
Joints recalked, 16-inch	34	
Joints recalked, 48-inch	8	
		226

Force Mains—

Joints recalked, 48-inch force mains	5	
Joints recalked, 42-inch force mains	5	
Joints recalked, 36-inch force mains	30	
Joints recalked, 30-inch by-pass	4	
		44

Gates—

New gates set	10
New gates set in place of useless ones	19
Gates cleaned and oiled	39
Stuffing boxes repacked	56
New top-nuts	11
New screws	4
New gate boxes set	10
Gate boxes lowered to grade	26
Gate boxes raised to grade	23
New covers	12

Special Work.

Water Mains Laid, Lowered, Moved, etc.—

Laid 332 feet of 6-inch pipe on Folsom place, between Linwood and Essex streets.

Laid 482 feet of 6-inch pipe on Barbey street, between Pitkin and Belmont avenues.

Laid 332 feet of 8-inch pipe on Hopkinson avenue, between East New York avenue and Eastern parkway.

Laid 6 feet of 6-inch pipe on Hopkinson avenue, between East New York avenue and Eastern parkway.

Laid 750 feet of 8-inch pipe on Sterling place, between Kingston and Albany avenues.

Laid 64 feet of 6-inch pipe on Sterling place, between Kingston and Albany avenues.

Laid 130 feet of 12-inch pipe on south side of Atlantic avenue, east of Essex street.

Laid 6 feet of 6-inch pipe on south side of Atlantic avenue, east of Essex street.

Lowered 606 feet of 6-inch pipe on Christopher street, between Dumont and Blake avenues.

Lowered 30 feet of 6-inch pipe on Barbey street, between Glenmore and Pitkin avenues.

Lowered 84 feet of 6-inch pipe on Liberty avenue, corner Atkins street.

Lowered 324 feet of 6-inch pipe on Nicholas avenue, between Ridgewood avenue and Etna street.

Lowered 200 feet of 1¼-inch pipe on Nicholas avenue, between Fulton and Atlantic avenues (private main).

Lowered 260 feet of 16-inch pipe on Essex street, north of Blake avenue.

Lowered 96 feet of 6-inch pipe on Blake avenue, west of Essex street.

Lowered 250 feet of 16-inch pipe on Essex street, between Belmont and Sutter avenues.

South side of Atlantic avenue, between Essex and Elton streets, cut out 6-inch branches to hydrants and mains on side streets and moved 8-inch main to curb and connected branches.

South side of Atlantic avenue, between Van Siclen and New Jersey avenues, cut out all branches on 8-inch main and moved 1,325 feet of 8-inch main to curb, and connected all branches.

Miscellaneous—

Repaved around gate boxes	27
Repaved over mains	39
Repaved opposite fire hydrants	8
Sidewalks repaired around fire hydrants	9
Districts shut down for contractors	34
Water turned on in new districts	34

Coney Island Repair Yard.

Fire hydrants, repairs, etc.—

New fire hydrants set	25
New fire hydrants set in place of broken ones	12
Fire hydrants taken out for repair and replaced	167
Fire hydrants repaired	1,339
Fire hydrant services recalked	13
Fire hydrant wastes cleared	8
Fire hydrant nozzles recalked	96
Fire hydrant valves closed	448
Fire hydrants removed to other positions	7
Fire hydrants thawed, salted and oiled	114
Fire hydrants flushed	60
New nozzles	129
New sockets	220
New jam-nuts	146
New valves	616
New rods	93
New top-nuts	21
New bonnets	40
New caps, chains and eyebolts	130
New casings	5

Drinking hydrants, etc.—

New drinking hydrants set	4
Drinking hydrants repaired	3

Leaks.

Service pipes—

Owners or agents notified	62
Taps shut off	73

Mains—

Joints recalked	91
New joints on mains	79

Gates—

New gates set	42
New gates set in place of old ones	13
Gates repaired	746
Gates cleaned and oiled and stuffing boxes repacked	646
New screws	21
New glands	4
New stuffing boxes	7
New bolts	53
New bonnets	4
New topnuts	28
New rubber gaskets	1
New gate boxes, set	30
Gate boxes raised to grade	54

Branches—

New branches cut in	24

Water Mains Laid—

775 feet of 8-inch pipe and 21 feet of 4-inch pipe on Forty-fourth street, from Second to First avenues.

2,250 feet of 12-inch pipe on Neptune avenue, from West Twenty-third to West Thirty-sixth street.

342 feet of 8-inch pipe, from West Thirty-sixth street to Sea Gate.

200 feet of 6-inch pipe on Bay Tenth street.

300 feet of 4-inch pipe on West Twenty-first street, from Surf avenue south towards Ocean.

200 feet of 4-inch pipe on West Twenty-third street, from Surf avenue towards Ocean.

237 feet of 8-inch pipe on Mermaid avenue, from West Fifteenth street to Stillwell avenue.

475 feet of 6-inch pipe on West Seventh street, from Avenue U north on Seventh street.

Miscellaneous—

Water shut off to make connections	26
Water turned on new mains	31

Respectfully submitted,

HENRY HAWKES, Superintendent of Repairs.

BUREAU OF WATER REGISTRAR.

A gratifying increase in the revenues in the Borough of Brooklyn is shown by the report of the Water Registrar. It should be borne in mind, however, that a large part of the progressive work in connection with the handling of the receipts does not show its results during the current year. For example the extension of the system of metering brings to the City a larger revenue, but it is many months before the returns show the effect of the change made. Several items in the report should receive especial attention, notably the changes inaugurated which have resulted in

doing away with the congested conditions which have usually existed in the office during the days immediately preceding the taking effect of the penalty. By these changes the time of the taxpayers has been saved and great convenience to all persons having dealings with the office has resulted from the new method.

The resurvey work has been continued during the year with satisfactory results. It should, in my opinion, be prosecuted until the whole city is covered.

A number of changes in routine work have been made, especially in connection with the issuance of permits. It is thought that the present methods are more in accord with the proper administration of the work.

The co-operation of the Bureau should be noted, also, in the efforts to obtain an adequate return for the water supplied to the American Sugar Refining Company and other large users.

City of New York, Borough of Brooklyn,
Department of Water Supply, Gas and Electricity,
Bureau of Water Rates, Municipal Building, Rooms 7, 8 and 9,
Brooklyn, December 31, 1903.

Hon. ROBERT VAN IDERSTINE, Deputy Commissioner:

Dear Sir—Herewith I submit a report of the work of the Bureau of Water Rates, Borough of Brooklyn, for the year 1903:

On taking office on January 9, 1903, I found Mr. M. J. O'Donoghue, Cashier, acting as Registrar, having very creditably discharged the duties of that office during the incapacity of the late incumbent, Major Augustus C. Tate.

As will be seen from Exhibit A, the receipts for 1903 show considerable increase over those of 1902. I think the showing is a good one, considering the fact that no effort has been made to enforce collection by drastic measures, and from the further fact that in 1902 the receipts were above the normal. It has not heretofore been the practice, I believe, to take cognizance of water revenue paid in the Bureau for the Collection of Arrears, and that of Taxes. They are included in the gross figures herewith reported, but it is well to remember that all statements from the Arrears Bureau are subject to correction; such corrections, however, are seldom considerable in amount.

During the year extensive alterations have been made in the offices occupied by this Bureau. It is gratifying to be able to state that the conditions under which work is now done by the clerical force are vastly improved. Clerks are no longer compelled to labor under artificial light during clear weather and midsummer. In every case each one now has a direct sidelight. By a rearrangement of the stationary desks more room has been secured, and on the whole the conditions are far more favorable than they were on the first of January, 1903, though the size of the present office is very much less than it should be to properly accommodate the business which is at present being done.

The complaint made in the early part of the year in regard to the general discipline of the force is entirely unnecessary at this time, as shortly after the first of the year a great change was noticed, and at present and for a long time past there has been no ground for any complaint in this respect.

On taking office I found that great improvement could be made in the method of handling cash, and for the purpose of preventing long lines of waiting citizens, which had become a by-word and reproach during the busy periods of the year. It was the practice to compel the rate-payer to put his bill in at one window, pass slowly to another window through which the money was handed to the Cashier, and then to a third where the receipted bill was passed out. At the first window was stationed an Assistant Cashier, who entered the amount on the Cashier's blotter and then passed the bill to the Cashier, who by this time—if the Police Officer was attentive—had received the currency or check for that particular bill. The Cashier counted the money, compared the bill with the stub attached thereto, and if the money and the amount of the bill agreed, stamped the bill and the stub, writing his own name below, tore off the stub, and passed the bill to other assistants standing at his right. These latter assistants entered the details of the section or ward, block, lot, name on bill, and amount in the several columns of the cash book, passing the bill to another Clerk to be copied on a sheet for the Comptroller, then passing the bill out of the third window to the rate-payer. This system led to long delays, caused confusion and difficulty in reaching a balance, and often consumed from fifteen to twenty minutes after the bill had been placed in the first window. In addition to the time actually required to pay the bill, the rate-payer was very frequently compelled to wait on the line for several hours; in fact instances are known when women with children in arms have had to return to the office three days in succession before payment could be made.

The Assistant Cashier who entered on the blotter also had charge of another book in which account was kept of all payments made by plumbers, builders and others who had secured permits for taps, etc.

As now constituted, the cash system provides that the rate-payer shall put his bill and money together through the window directly in front of the Cashier. The latter compares the bill and the attached stub to see that they agree, counts the money, and if the amount is correct, stamps the bill and stub with a new form of stamp, which makes it unnecessary to sign or stamp his name separately, as heretofore, passes the bill out of the window and the stub to an assistant at his right, by whom is entered the section or ward, block, lot and amount on the cash book; all of which is done in less time than it takes to describe the operation. No entry is now made of the name on bill, as it is not essential, the names more often than not being other than the present owner of the property, and therefore simply confusing. During the busy season I installed an adding machine in the cash room to secure a mechanically accurate check on the cash book entries, and it is still in use.

Under the new system the long line is done away with and the ratepayer receives the bill back receipted in a quarter of a minute instead of fifteen or twenty. This expedition in getting the public away from the cash window prevents the formation of long lines. That the change is appreciated by those doing business with the office is evident from the remarks constantly heard.

In place of the several books formerly used in the cash office there is now but one, and in this all entries of whatever nature are made. This requires less work, in addition to keeping the cash account in compact form, as well as reducing stationery expenditure.

Notwithstanding the increased efficiency of the cash office during the present year I found that a decrease of approximately one-half could be made in the expense of running it, and that has been done.

Requisitions for rate bills have been very promptly filled during the past year, and in this the testimony of those who have dealt with this Bureau for many years is that never before have they secured bills so early in the season. A successful effort has been made to have all bills made out when ratepayers call for them, though this work was very difficult and greatly hampered by the delay in getting new bills from the printer. Under the present system, in 1904 all bills should be completed in advance of the first day of May. In comparison with the corresponding periods of former years, the work of the rate clerks was very arduous, they having done a very large amount of labor in connection with special work.

About the first of May great difficulty was experienced when citizens learned of the charge for rear buildings, a misconstruction of such rule having caused inspectors to report as rear buildings all structures, even frame sheds used to store garden tools, and in some cases doll houses. A complete inspection was made of such reported buildings with a view to the consequent removal from the books of a large amount of erroneous charges.

During the year investigation was commenced of all premises entered upon the rate books as exempt, and it was found that premises formerly occupied by various institutions had been exempt in some cases as many as eleven years, and yet during that time had been occupied for other than exempt purposes. Notices were sent to every institution or corporation supposed to be entitled to exemption, and they have filed with this Bureau copies of their papers of incorporation and affidavits regarding their claims for exemption, and these matters are being gone over carefully at the present time to determine whether they should remain on the exempt list or be charged.

Inspections are also being made for the purpose of securing data in regard to exempt premises, and the whole amount of the information received will be tabulated and made a permanent record of the office.

The time clock which was in use when I took office was removed about the first of February. The lack of punctuality, which gave occasion for its use in 1902, has been almost entirely absent during the present year. In reference to the use of the time clock itself, I would say that its discontinuance has had a salutary effect, it being my opinion that such devices are demoralizing rather than otherwise, it being found impracticable to prevent one clerk or inspector "ringing up" for another. This may not be equally true in a private concern, but it certainly is in a public office. This being the case, its records were worse than valueless, giving those in authority and not in actual touch with conditions a false impression as to the discipline maintained.

The general resurvey inspection of all buildings in the Borough was continued during the year. Ward 28, which was commenced in the year 1902, was completed, and Wards 27, 25, 23, 21, 19, 7, 22, 1, 2 and 4 were commenced and completed during the year in the order named. The resurvey work was, however, considerably interfered with by special inspections which were necessary from tim to time in the correction of the books and on meter work.

In the Twenty-eighth Ward alone this work of correcting the books added approximately $4,000 to the rates for that ward, and I consider that the work in that ward was not done in as thorough a manner as that in many of those later, there being large room for improvement, there seemingly being no system pursued by which the inspection force could be kept constantly at their work, and by which efficiency could be secured. Shirking and false reporting has evidently been a common occurence; in fact the absolute reliability of the resurvey in the Twenty-seventh and Twenty-eighth Wards is open to question. From what I have learned I believe it will be economical to have another resurvey made, covering the ground already gone over before the first of January, 1903.

It was the custom up to February 23, 1903, for all Inspectors to report to this office daily at about 9 a. m. to receive their assignments from the Chief Inspector, and to leave the Municipal Building and go to their work without supervision of any kind, not reporting until the following day. On February 23 the Chief Inspector's duties were changed, and all Inspectors on resurvey were met by him at a rendezvous at the scene of their work daily at 9 a. m. This method has resulted in securing a fair day's work to the City, and in a very much greater accuracy in the records.

Brooklyn's area being nearly 43 square miles, and Manhattan less than 20, the necessity of a large force of Inspectors was apparent, and to this end you have from time to time made such increases as to put the force on a proper basis.

On taking office I was surprised to find that carfare vouchers were usually delayed in payment for many months, though in every case the full amount sworn to have been expended was always paid eventually. Inquiry and observation reveal the fact that excessive, unexpended carfares charged against the City were regarded as a perquisite of an Inspector, and that it excited much displeasure when fares admittedly fraudulently charged for in a sworn statement were disallowed. A system of checking and certification by supervising officers has been instituted, resulting in a very great decrease in fares, though an Inspector now receives the money due him almost immediately upon presenting his affidavit of expenditure. As a means by which householders may more readily identify the Inspectors, and to secure easier access to houses, as well as to cause a greater circumspection in regard to behavior, I strongly recommended the adoption of a uniform at the commencement of spring, and until spring opened the wearing of a uniform cap of similar design to the one submitted for your approval, and now worn.

While making general inspections it has been the practice to keep a careful lookout for leakage. The number of leaks found on an average in each ward has been in the neighborhood of between fifteen and twenty-five hundred, showing a very large aggregate number of leaks in the City.

In accordance with the recommendations which I made to you in the early part of the year, you ordered in the latter part of June the issuance of permits of several kinds and the supervision of water consumed by shipping changed from the Bureau of Repairs to Distribution and Complaints to this Bureau. The Association of Master Plumbers of Brooklyn have expressed themselves as very highly pleased at the change in method, and have conferred from time to time with this Bureau in regard to what they consider to be grievances, all of which have been corrected to their satisfaction. In consequence of these changes a plumber may now expeditiously transact his business and leave the building, taking far much less time than formerly.

Many builders have been detected since the change in permit methods in erecting more houses than those for which they had taken out water permits. Upon being threatened with prosecution on the first offense, they are now as a rule scrupulously observing the law. Monthly sworn returns have been required from the plumbers for all new fixtures set that are ratable. This was required of them some years ago, and was discontinued during the last administration. With over 700 licensed plumbers in this borough, many of them constantly setting new fixtures, an increase in the revenue necessarily results. Under the law providing for sworn returns plumbers could legally be asked to make statements weekly, but that would be an unnecessary hardship. To avoid any objection to the increased payment for acknowledgment fees, I have had the Permit Clerk created a Commissioner of Deeds, instructing him to accept no fees, and posting a conspicuous sign to that effect.

On the whole, the consolidation of permit issuing under one clerk and assistants has greatly simplified the work and rendered the collection of fees certain, and has expedited the transaction of business by the public, so that they spend no more time in this office than is absolutely necessary.

Many minor changes in the forms of permits and their methods of issuance have been made. One of the former requirements that worked an unnecessary hardship upon plumbers was that before a permit for tap or repair could issue they must see that all arrears on the premises were paid. As this resulted in no increase of revenue that might not be obtained by simpler and less annoying means, a change was made in this regard. Plumbers may now secure permits without delay.

In the early part of January it was evident that an understanding existed among the Inspectors detailed to read meters that 20 to 25 readings should constitute a day's work, whereas the average an Inspector should make is very much larger. A radical reorganization in the personnel of the inspection force has resulted in a much higher average being made.

The work of the Meter Clerks has been rendered arduous by a poor system of bookkeeping, which has, during many years past, been greatly improved from time to time, but which at the present day is still far below that which it should be.

While a Meter Reader's carfares should be very few, it has happened month after month that between four and five dollars have been certified by these men as having been expended while on duty, whereas a very much less amount was actually expended. This led to the holding up of carfare vouchers for several months at a time, but in all cases they were paid after this considerable delay.

A thorough inspection of all metered premises is now in progress, and many of the six thousand buildings have been carefully gone over and diagramed and these diagrams transferred to proper paper for the purpose of binding in book form, so that a permanent record may remain in the Department of all meters and their connections, the purpose for which water is used and such details as seem necessary from the point of view of the Department.

On April 29 Isidore Heilbrunn, of No. 375 Broadway, doing business as "the Electric Home Laundry," was arrested for violation of section 651A of the Penal Code. It was found that he had a rubber hose connection from a hydrant in a rear lot, and that he secured practically all of a large supply from that source, only permitting his meter to operate when an Inspector was on the premises. Heilbrunn was held for the Court of Special Sessions, and on conviction was fined $100. This was the first case to arise in connection with this new section of the Code.

During the year a number of premises with illicit connections have been found, and in each case they have been vigorously prosecuted in connection with the offices of the District Attorney and of the Corporation Counsel, but it has been found that without a Special Counsel attached to this office it has taken a great deal of time of the employees of the Department when the matter could more properly be handled by some representative of the Corporation Counsel regularly detailed for such matters.

There has been a gratifying increase in the number of readings made daily by the Inspectors attached to the meter division, after the first few months of the year an increase of 50 per cent. being noted.

Electric flashlights have been supplied to all meter readers and have added greatly to the efficiency of those employees and to the safety of buildings in which candles and matches were formerly used.

During the first quarter no effort was made at metering, pending action by the Legislature on the bill introduced at the suggestion of the Department for the pur-

pose of permitting the City to pay for the cost of meters and their installation. This bill was equitable and necessary on its face, and, pending action by the Legislature, it was but fair that no forced installation at the cost of the consumer should be made.

The problem of controlling the unregulated use and waste of water in public schools and buildings, and, in fact, in all exempt classes of structures, has been met by the installation of a large number of meters which have been in stock in the North Portland Avenue Repair Yard for the last six years. I feel that their use will lead to a very great decrease in the waste of water and the compiling of valuable statistics in regard to buildings from which no water rates are received.

During the year I have called attention to the fact that of the authorized meters, to wit, Worthington, Crown, Thomson, Trident, Nash, Standard, Hersey Disc and Hersey Rotary, only one, the Worthington, cannot be reversed in its action. I would recommend that all authorized meters be compelled to have an attachment, which, I understand, can be very easily arranged, whereby they will come under the head of non-reversible.

It would seem to me that a change in the system of authorization should be made and that all types of meters should pass a clogging test, the object being that where a meter is out of order and not registering, that no water will pass through the instrument. This is the case, I believe, in but two or possibly three of the meters which are now in use, and as a consequence very great trouble is experienced in a large percentage of the meters set.

As this Bureau is responsible for the accuracy of meters, I recommend that the present method of testing be changed so that the Registrar may have control of the testing apparatus and its use. The present apparatus, as before stated, at the Western District Repair Yard is not calculated to make other than an approximate test, it being, in fact, practically valueless. As everything pertaining to meters, with the exception of the testing, is now connected with this Bureau, it would seem logical on its face to have the testing under the direct supervision of this office.

During the year much work was done in preparing specifications for bidding on a meter-testing apparatus to be installed at the North Portland Avenue Repair Yard. Bids were received, and the lowest bidder being somewhat less than $4,000, is now awaiting the award. It is hoped that early action will be taken in reference to this matter, and that the contract may be speedily let, because of the absolute inefficiency of the apparatus at present and for many years in use for the testing of meters.

Considerable work has also been done in regard to the sealing of meters by wiring and a lead seal, and during the month of December a suspension of the rule in reference to setting was made for the Borough of Brooklyn, which at the present time is being carried out.

I feel that very salutary benefits will arise if the new method of setting and sealing is prosecuted. It will not only lead to a considerable reduction in the cost of setting a meter, but where repair is necessary, it affords a convenient, expeditious and economical means of taking out a meter and replacing it with an intermediate, that water may not be cut off on the premises while a meter is being repaired.

Among the annexed exhibits will be found forms for new systems in the issuance and recording of the ten kinds of permits and the keeping of the meter ledgers and their subsidiary records. While there may be reasons why it is not safe to use ledger cards for meter accounts, the forms appended can be applied to either the so-called loose-leaf books or the ordinary bound volumes.

Attached hereto will be found the following exhibits:

Exhibits.

"A." Statement of Permits Issued and Approximate Revenue Therefrom.
"B." Statement of Water Meters in Use and Set During the Year Ending December 31, 1903.
"C." Statement of Settings, Discontinuances and Meters in Use During the Year Ending December 31, 1903.
"D." Schedule Showing the Nature of Business for which Meters were Set During the Year Ending December 31, 1903.
"E." Schedule of Repair Permits Issued to Plumbers During the Year Ending December 31, 1903.
"F." Changes in Force During the Year Ending December 31, 1903.
"G." Summary of Changes in Force During the Year Ending December 31, 1903.

Note—Collections for Water Rates, etc, decreases and increases, 1902 and 1903, are found in General Statement for Water Revenue.

Respectfully,
J. E. EASTMOND, Water Registrar.

Exhibit "A."

Statement of Permits Issued and Approximate Revenue Therefrom for the Six Months Ending December 31, 1903.

Shipping (whole year 1903)	492	$13,355 00
Fire hydrants	237	5,806 64
Special	47	23 50
Builders	612	10,018 41
Taps	1,611	5,709 25
Street opening	2,348	635 00
Cement walk	626	563 09
Continuation	458	229 00
Draw and plug	83	83 00
		$36,422 89

Memo.—Prior to July 1, 1903, all permits except "Shipping" were issued in the Bureau of Distribution and Repairs.

Exhibit "B."

Statement of Water Meters in Use and Set During the Year 1903.

Meters in use December 31, 1902	4,512
Meters set during the year ending December 31, 1903	1,838
	6,350
Accounts closed during the year ending December 31, 1903	77
Actual number in use December 31, 1903	6,273

Exhibit "C."

Statement of Settings, Discontinuances and Meters in Use During the Year Ending December 31, 1903.

Settings.

	5/8.	3/4.	1.	1½.	2.	3.	4.	6.	Total.
Worthington	17	7	9	4	22	16	15	2	92
Thomson	603	71	74	20	37	11	8	9	833
Trident	620	36	31	17	22	5	..	..	731
Crown	41	10	11	4	2	1	1	..	70
Nash	24	4	1	2	3	2	1	..	37
Hersey	3	..	..	..	..	1	1	..	5
Standard	61	5	1	..	..	..	1	..	68
Gem	..	..	..	..	1	1	..	..	2
Total	1,369	133	127	47	87	37	27	11	1,838

Discontinuances.

	5/8.	3/4.	1.	1½.	2.	3.	4.	6.	Total.
Worthington	..	..	2	1	2	1	..	..	6
Thomson	8	2	2	..	2	1	..	..	15
Trident	5	..	2	..	..	..	..	..	7
Crown	7	1	1	1	..	..	..	..	10
Nash	..	1	..	..	..	..	..	..	1
Hersey	..	..	..	..	..	..	..	..	..
Standard	..	..	..	..	..	..	..	..	..
Gem	..	..	..	..	..	..	1	..	1
Total	20	4	7	2	4	2	1	..	40

Meters in Use.

	5/8.	3/4.	1.	1½.	2.	3.	4.	6.	10.	Total.
Worthington	151	74	197	116	262	94	73	4	..	971
Thomson	1,446	180	284	86	119	31	35	18	..	2,199
Trident	1,017	104	104	42	40	11	10	6	..	1,334
Crown	758	175	251	69	101	13	13	..	..	1,380
Nash	77	13	11	5	4	2	1	..	..	113
Hersey	13	..	..	..	..	1	1	..	..	15
Standard	90	7	3	..	..	..	1	..	..	101
Gem	3	..	..	2	68	27	40	8	1	149
Miscellaneous	..	6	3	..	..	..	2	..	..	11
Total	3,555	559	853	320	594	179	176	36	1	6,273

Exhibit "D."

Schedule Showing the Nature of Business for which Meters were Set During the Year Ending December 31, 1903.

Apartment house	5	Gas house	2
Bakery	2	Gymnasium	1
Bakery and dwelling	20	Hose bib	2
Baths	3	Hotel	31
Blacksmith	6	Hotel and saloon	13
Boiler house	2	Hotel and stable	12
Bottler	10	Hall	4
Bottler and dwelling	5	Hydrant	1
Barber and dwelling	1	High school	4
Brewery	1	Hospital	3
Butcher and dwelling	1	Indian Camp (Coney Island)	1
Coal yard	2	Laundry	156
Coal mine (Coney Island)	1	Laundry and dwelling	60
Coal yard and stable	1	Laundry and store	11
Cooperage	2	Laboratory	1
Carousal	2	Lodging-house	2
City Court-house	3	Market	5
Carpet cleaning	1	Municipal Building	1
Cemetery	3	Milk depot	1
Construction	10	Organ	1
Comfort Station	6	Office and dwelling	1
Carpenter shop	2	Office building	12
Church	14	Office	11
Church organ	1	Pork packing	6
Club	17	Pumping Station	1
Confectioner	10	Pile driver	1
Confectioner and dwelling	2	Power house	6
Docks	3	Photographer	1
Dwelling and stable	61	Park	1
Dwelling	255	Restaurant and saloon	2
Dwelling and dairy	1	Restaurant	12
Dwelling and greenhouse	8	Restaurant and dwelling	1
Dwelling and hall	1	Railroad station	4
Dwelling and florist	5	Saloon and dwelling	338
Dwelling, bakery and stable	6	Saloon and hall	1
Dwelling and factory	2	Saloon	129
Dwelling and store	1	Store	12
Druggist	2	Store and dwelling	57
Dyeing	1	Stable	105
Fountain	1	Stable and dwelling	18
Foundry	1	Storehouse	5
Factory	197	Shed	3
Factory and dwelling	2	School	3
Florist	12	Skating rink	1
Fire service	23	Stone crusher	4
Freight depot	1	Store and office	6
Flat	1	Store and stable	2
Ferry	1	Saw mill	3
Greenhouse	3	Slaughter-house	1

Shooting gallery	1	Thirteenth Regiment Armory	2
Stone yard	1	Warehouses	3
Shop	2	Public schools	40
Theatre	7		
Telephone company	2	Total	1,838

Exhibit "E."

Schedule of Repair Permits Issued to Plumbers During the Year Ending December 31, 1903.

	5/8.	3/4.	1.	1½.	2.	3.	4.	6.	10.	Total.
Worthington	19	14	22	16	42	15	13	1	..	142
Thomson	165	30	30	5	19	6	7	5	..	267
Trident	118	18	19	4	2	2	1	3	..	167
Crown	187	31	40	11	17	2	2	..	..	290
Nash	15	2	4	1	1	..	..	..	..	23
Hersey	4	..	..	..	..	1	..	..	..	5
Standard	31	4	3	..	..	..	..	..	..	38
Gem	..	..	..	..	19	4	9	..	1	33
			Bee Empire.							
Miscellaneous	..	3	1	..	..	..	..	..	..	4
Total	539	102	119	37	100	30	32	9	1	969

Exhibit "F."

Changes in Force During the Year Ending December 31, 1903.

Appointments—	
Registrar	1
Clerk	1
Inspectors	15
Appointments (Temporary)—	
Clerks	23
Inspectors	26
Transferred to this Office—	
Financial Clerk	1
Clerks	4
Inspectors	4
Resignations—	
Clerks	2
Clerks (temporary)	4
Inspectors	4
Removals—	
Clerks (temporary)	21
Inspectors (temporary)	17
Inspectors	9
Deaths—	
Clerks	2
Transferred from this Office—	
Assistant Cashier	1
Clerks	3
Inspectors	4

Exhibit "G."

Summary of Changes in Force During Year Ending December 31, 1903.

Total Increases.

Registrar	1
Clerks	29
Inspectors	45
	75

Total Decreases.

Assistant Cashier	1
Clerks	32
Inspectors	35
	68

Hon. ROBERT VAN IDERSTINE, Deputy Commissioner, Water Supply, Gas and Electricity, Brooklyn, N. Y.:

Dear Sir—As an introduction to my report of the operations of the Bureau of Electricity and Gas during the year 1903, attention is directed to the limited facilities at our disposal—such as appropriation, office quarters and legal means of enforcing our requirements. These facilities are not at all commensurate with the quantity and importance of the work devolving upon the bureau; and, for this reason, many of the duties assigned to us by the Charter receive only limited attention or none at all.

Testing of Gas.

Photometric tests (for determining the candle power of illuminating gas), abandoned in 1902, have been resumed. Recent tests confirm the record of former years: with rare exceptions the candle power exceeds the value fixed by the Charter. Our experience shows the most prolific sources of complaints of "poor gas" to be insufficient and erratic pressure in the mains, or defective appliances employed by the householder. The making of photometric tests and the investigation of gas complaints occupy the time of one Inspector.

An ordinance regulating gas pressures is urgently needed; and a recommendation of this nature has accompanied each of my former reports. The supervision of gas piping, recently assumed by the Superintendent of Buildings, will prevent in new installations many of the conditions which in old buildings are a prolific source of gas complaints.

The Charter requires also that illuminating gas be tested for impurities. We have never undertaken these tests, there being no one to operate the apparatus, which was purchased in 1898. I consider this to be the least important branch of our work; for the candle power indicates the commercial value of the gas, and the impurities are a matter of sanitary importance principally, to be controlled when necessity arises by the department charged with the care of the public health.

The Charter provisions as to penalties are largely inoperative, on account of the impracticability of securing the coincidence of two faulty conditions (low candle power and high impurity) on three successive occasions not less than a week apart.

Electric Meters.

The Charter prescribes that all electric meters in use shall be inspected "within one year after this act shall take effect." There are about seven thousand such meters in Brooklyn, out of which number we have tested twelve after the lapse of six years. Similarly, all electric meters subsequently brought into service must be proved. These, too, we have ignored.

Six years ago apparatus for testing meters was procured. Owing to the development of less cumbersome methods of testing, a small outlay is required to bring the equipment strictly up to date. No inspectors of electric meters have ever been appointed; and the twelve meter tests above mentioned owe their existence to an importunity on the part of the complainants that could not be ignored.

I have been endeavoring for several years to obtain an annual appropriation of twenty-five hundred dollars to cover the salaries of two inspectors of electric meters—a force sufficient to inaugurate the work, at least.

Interior Conductors.

Under this head may be classed the inspection of all new electrical appliances or wiring introduced into buildings, the reinspection of old electrical equipments and the investigation of all fires whose origin is doubtful or is attributable to electricity. Elevated railway cars, when electrically equipped, are included in this category.

While the public generally has come to appreciate the purpose and results of our inspection, and while compliance with our requirements is the rule rather than the exception, we find ourselves hampered at times by the inadequacy of the legal means available for enforcing our orders. An ordinance governing electrical matters is a vital necessity. Its enactment has been delayed too long; and other and less important cities are in advance of us in this particular.

At this point my annual recommendation for the licensing of electrical workers may be inserted: "There are some electrical workers, I regret to say, who, either through ignorance or intent, vitiate to some extent the good accomplished by our inspections. The penalty attached to a proposed wiring ordinance would be no assurance against incompetency; nor would it prove a bar to rascality in cases where payment of a non-cumulative fine would be cheaper than compliance with our rules. A system of licensing would tend to weed out the ignorant and deter the vicious."

Weekly inspections are made of special electrical features used by theatrical companies. Occasionally some very dangerous features develop and receive our prompt condemnation. We have been fortunate in securing the hearty co-operation of the managers and house electricians of the various theatres.

For the systematic handling of these matters, the borough is divided into five districts to each of which an inspector is assigned permanently. I propose to curtail the size of the districts and increase their number to seven, in the event of obtaining the three additional inspectors of electrical conductors asked for in the budget for 1904. At present, during the summer season one inspector is obliged to cover South Brooklyn, Bath Beach and Coney Island, whereas one inspector—if not two—could be employed advantageously at Coney Island alone.

Furthermore, it is our duty to see not merely that electrical appliances are installed properly, but that they are maintained properly. This second duty cannot be performed satisfactorily by the present force of inspectors. I believe that a systematic canvass of the old electrical equipments throughout the borough should be undertaken, details being so arranged that each equipment would come under observation at least once in two years and preferably at shorter intervals. At the present time it is only in special cases that old equipments—aside from those that may be visited for the purpose of inspecting additional installations—receive this attention.

Acknowledgments are due to Fire Marshal Beers for the assistance which he has given so courteously in securing the correction of faulty and dangerous electrical work.

Overhead Conductors.

The situation remains practically unchanged since last year, at which time I wrote: "Brooklyn is cursed with a vast extent of heterogeneous overhead wiring—on poles, elevated railroads, housetops, or trees; the official mileage being given as . To this figure must be added the length of abandoned or unauthorized wires, many of which have become broken and entangled with live wires. Such a condition constitutes a constant menace to life and property. Furthermore, many of the pole lines authorized in the past and in use at present, are utterly at variance with modern principles of safe and neat construction."

I do not wish to be understood as belittling the accomplishments of the year just past; but the results that we have attained, while of considerable importance in themselves, form such a small percentage of the total work to be done that they are hardly apparent. We cannot hope to renovate in five years what has been the growth of fifty.

We are issuing fifty-one hundred permits a year for erecting, shifting or removing poles or overhead wires. For the care of all this work there is but one inspector available. I purpose to assign to this duty one of the three additional inspectors of electrical conductors asked for in the budget of 1904.

There are between forty-five and fifty thousand poles in the Borough, about half of which are iron poles supporting trolley span wires. Many of the wooden poles are entirely unnecessary, either because they are carrying wires for which subway provision has been made or because they are paralleled by other poles to which the wires might be transferred. The City itself is responsible, through its fire and police signal systems, for the retention of some thirty miles of pole line—a matter of perhaps a thousand poles.

This year the number of poles erected again exceeds the number of poles removed. This is hardly an indication of compliance with the spirit of the subway acts, although the extensions of pole lines have occurred almost without exception in the suburban districts, where the conditions do not as yet warrant the construction of subways. As a partial offset to this natural and legitimate extension of pole lines, the department has adhered more rigidly than ever to the policy of a "restricted territory," adopted in 1898. Within this territory, which comprises the heart of the borough, the extension of pole lines is prohibited.

So long as our highways must be burdened with poles and wires the latter should be made as little objectionable as possible. Proper painting and stenciling, the replacing of decrepit poles and the prosecution of those persons who willfully deface the poles by attaching advertising matter thereto (in defiance of a city ordinance) should be insisted upon. In the matter of old and unpainted poles the city itself sets a sorry example. I cannot recall a single instance where the city has painted one of its poles at our request. The companies have painted thousands.

It is regrettable that closer relations do not exist between the city's telegraph bureaus and this office. The lack of harmony in matters of detail will continue to exist, probably, until all the municipal electrical interests shall have been brought under the control of a single head. When that time comes it will be opportune to consider the municipal ownership of poles, an idea which seems to me to offer the best solution of the pole and wire problem in a large city.

Wire burial will be treated under the heading of "Subways."

Third Rail.

The third-rail system—as used upon our elevated roads—is a development, and as such has not reached a perfected stage as yet. When first installed in Brooklyn it was modeled after systems in use in Chicago and on the Brooklyn Bridge. The rail of the Manhattan elevated railway is similar to that in Brooklyn, but the former is partially protected by timber guards which have objectionable features as well as admirable ones. The Boston third rail is protected by a low fence, placed between the rail and the footpath; otherwise it is exposed as in Brooklyn.

During the past six years the department has studied the situation very carefully. No one pretends that the present exposed rail is entirely satisfactory. All that can be said in its favor is that good engineering practice sanctions it pending the demonstration of the practicability of something better.

Subways.

As usual, the companies have proceeded with the construction of subways other than those ordered by the Board of Estimate and Apportionment. As usual, also, the city has failed even to avail itself of the free ducts provided for its use by the companies.

Last year witnessed the inauguration of a definite and legal policy of wire removal, determined upon by our Commissioner and the Board of Estimate and Apportionment. It will be remembered that in September, 1902, that Board passed a resolution ordering the clearing of twelve and a half miles of street. In June, 1903, the Board passed a second resolution covering about twelve miles additional. Our department is charged with supervising the carrying out of the terms of these resolutions, and the wire removal has progressed well on toward completion. In this matter also the city itself is the laggard.

Subsurface Construction Maps.

In last year's report I called attention to the wasteful manner in which our highway subsurface areas have been occupied and to the incomprehensiveness of the development of our underground transmission lines. I stated:

"While the undesirable conditions which now exist can be modified but slowly, if at all, the concentration (by the Charter) in the Department of Water Supply, Gas and Electricity of control of all underground transmission systems, except sewers, renders the present an opportune moment for laying the foundation of a broad policy which shall effectually prevent future unintelligent or careless underground construction.

"In our own Department we are supposed to have at hand all the records of water, gas and electricity; while the Bureau of Sewers has its own maps. The information required is often either missing, or inaccessible, or obtained from so many sources that patient effort is needed to obtain a correct idea of the inter-relation of the different systems at the point under consideration. The preparation of a set of official maps showing in detail and to scale the exact location and physical characteristics of every pole, every pavement, every car track, every pipe, duct or subway, and every manhole, would be a work of considerable magnitude, but of inestimable value. And it would furnish the most exclusive testimony in favor of public electrical subways."

Such a map is now in course of preparation. Our one Draughtsman has completed a number of the plates (scale, 20 feet to the inch) on linen-backed paper, colors as well as symbols being employed to designate the various systems. I have asked for a special appropriation of $5,000 for 1904, in order that we may make better progress than at present, our present advance being extremely slow. There is absolutely no question but that the importance of these maps—as exhibited by the maps themselves—warrants an immediate appropriation of $25,000, to be expended within a year or eighteen months. In the course of a few years this work could be made self supporting, if that be desired.

Electrolysis.

Since last summer, Mr. Blackwell, an Electrical Engineer of the Department, has been engaged in an investigation of the subject of electrolysis. He represents our Consulting Electrical Engineer, is detailed to the office of the Deputy Commissioner for Brooklyn, and is in almost daily consultation with me.

The Office.

Our quarters are ridiculously inadequate. They were too small when we moved into them in February, 1902; and since that time our force has been increased by a Stenographer, two Clerks, an Inspector, and a Draughtsman. The head of the Bureau has no private office, and his more important reports are prepared, and official conferences are held, in quarters borrowed for the occasion. Two windows are all that we have. Had it not been for the loan of a portion of his quarters by Mr. Hawkes, Superintendent of Distribution and Repairs—to whom I make grateful acknowledgment—I should have been obliged to accommodate part of my force by placing desks in the hallway.

The force consists of 1 Electrical Engineer, 1 Head Clerk, 1 Stenographer, 2 Junior Clerks, 7 Inspectors (electric), 1 Inspector (gas), 1 Draughtsman.

At present we are employing a temporary Clerk to cut down arrears of office records dating back to 1898.

The operations of the Bureau have been as follows:

Photometric tests, inspections, applic tions for permits or certificates, permits or certificates issued, violation notices se' out.

These operations represent an increase of per cent. over those of 1902.

Through the dismissal, after trial of charges, of three Inspectors, and the appointment of three new men to fill their place , the work of the Bureau has been placed on a very much higher plane—one which compares favorably, I believe, with that of other bureaus of the City Government.

Recommendations.

1. A largely increased appropriation for this Bureau.
2. An ordinance regulating gas pressure.
3. An ordinance regulating electrical appliances installed in buildings.
4. An ordinance licensing electrical workers.

In conclusion, permit me to acknowledge the sympathy and encouragement that you have given to me, and to commend the very efficient work of our present force.

Respectfully,
H. B. MURTAGH, Electrical Engineer.

Hon. ROBERT VAN IDERSTINE, Deputy Commissioner:

Dear Sir—Agreeable to your instruction, I have the honor to state that the inquiry into the effect of the stray currents from the electric railroad systems and other purveyors of electric current upon the water mains and other subsurface construction in this borough has not yet progressed sufficiently far to give more than an indication of what may be expected from the completed work.

Considerable delay was experienced in obtaining the necessary instruments, as the style needed was not carried in stock by the manufacturer, and the preparation of the necessary apparatus mainly by the officer in charge of the inquiry.

The plan of operation consists in making a series of voltmeter readings between the rails and a fire hydrant, about twenty-five in all, which are averaged; then "drop of potential" readings are taken at the same point to determine the volume of current flow, if any, and its direction. Similar readings are taken between the construction of the Brooklyn Union Gas Company, the New York and New Jersey Telephone Company, and others where accessible. This work is now being pressed forward as rapidly as possible.

Drop of potential readings are also made along the line of the water mains, following the routes of the street railroads, to determine the volume and direction of current flow and to what extent the mains on the cross streets contribute to this effect.

The element of time in making these readings is carefully noted, as well as the linear distance between points at which the measurements are made, as it is purposed to analyze the results of the field work by means of data obtained from the average load curves of the various electrical power stations, and to show graphically, as simultaneous curves, the electrical conditions obtaining for some specified hour or hours.

By this method of procedure a fairly accurate and consistent approximation of the electrical conditions obtaining on the water system will be made possible, and the points at which the current is discharged, at which possible corrosion of the mains occurs, will be located closely.

An opportunity will be afforded for an exhaustive study into the condition of the water mains along the water front and in many important streets, and for comparing their physical appearance with the results of the electrical data already obtained during the prosecution of the work under the Dady contracts for replacing old mains, from which valuable and interesting results are expected.

Insulating Compounds.

Several insulating compounds and methods have been submitted for study and examination, and without entering into any discussion of the merits or value of any, it would seem that their efficiency is largely dependent upon the methods of application, for reason that a hole or flaw in the coating would endanger the main at such point by concentrating the electrical effect to one more or less small spot. On the other hand, the question of insulating the mains may be dismissed without further comment, as the expense for so treating a sufficiently great length of pipe to be of service to the system, with the cost of excavation, repairing, etc., would be prohibitive.

Insulating mains in the so-called "danger areas" or where the pipes are positive, would, apparently, have the effect of increasing the areas by pushing the boundaries further away from the central power station, and would therefore be inadvisable if for no other reason.

Assuming that the metal of which a pipe is made is fairly uniform, and that its outer surface is free from scale, tar or any other electrical insulating substance, the current discharge from such a pipe would be very nearly uniform over the surface from which the discharge is taking place, that is, the side of the pipe nearest to the object or body toward which the current is flowing, and would require a very considerable time to corrode the pipe to a dangerous thinness, but would, most probably, ultimately destroy it.

With this idea in view, the desirability of discharging the electrical current from the mains without disturbing, to a great extent, the electrical equilibrium, presents itself, assuming that it is practicable to coat the mains with any substance at all; the use of some conducting, indestructible material like carbon in plastic or sectional pipe covering form would seem to be more advantageous, as the current could be freely discharged from such surfaces without detriment to the main in any way.

Service Pipes.

The destruction of service pipes is frequently reported at this office; but the department having no active interest in such matters further than the loss of water, no active measures have been taken to protect them.

Where possible, samples of the damaged pipes have been obtained. None, however, have been from those districts in which measurements have been made up to this date.

It seems to be quite evident that the service pipes crossing the streets under the street car tracks, under some conditions, act as a safeguard to the mains proper by conveying the current to a point where the distance between the rail and the water system is greatly reduced, and confining most of the electrical effect to the service pipe itself.

In several locations from which pipes were reported destroyed in six months or a year, unofficial suggestion has been made to the plumber reporting the case to insulate the pipe under the roadbed and between the outer rails with small vitrified sewer tile pipe, cementing the joints and packing crushed coke into the mouths of the tile pipes and around the exposed service pipes for three or four feet on each side of the car tracks, as is shown in the diagram.

Sufficient time has not yet elapsed to demonstrate the efficiency of this suggestion, but it is purposed to examine these new pipes when the time has elapsed during which the old ones were destroyed.

As the electrical conditions are not disturbed by the execution of this suggestion, and as it may prove to be a palliative to this destructive action upon the service pipes, these recommendations will be made from time to time informally, or with such modifications as may suggest themselves and be regarded as expedient.

An effort is being made to have a small quantity of carbon tubing prepared to be used as a covering for service pipes in some location where a rapid deterioration has occurred, and in due course the experiment will be made the subject of a special report, provided there is no failure in securing the tubing desired.

The work now under way constitutes a diagnosis, and when all of the facts and data obtainable have been collected, arranged, analyzed and thoroughly digested, the question of a palliative or possible cure will receive consideration, but any definite statement as to the final results of this investigation would at this time be premature.

The importance of the electrolysis investigation to the future welfare of the subsurface water system cannot be too strongly emphasized, inasmuch as this deterioration is slowly but steadily and surely progressing. It is of urgent moment that this work be carried to the point of determining whether a cure is possible or a palliative best suited to the conditions obtaining and what means should be adopted to accomplish the end in view.

Respectfully submitted,
HENRY F. BLACKWELL, Electrical Engineer.

Department of Water Supply, Gas and Electricity,
Bureau of Lamps and Lighting, Municipal Building, Room 35,
Brooklyn, December 31, 1903.

Hon. ROBERT VAN IDERSTINE, Deputy Commissioner:

Dear Sir—You will please find herewith attached the report of the Bureau of Lamps and Lighting from January 1, 1903, to December 31, 1903, descriptive of the entire public lighting of the Borough of Brooklyn, which now comprehends 19,934 lamps, and the lighting of 427 public buildings.

This Bureau has been seriously hampered in its line of work for new lighting owing to an inadequate appropriation for lamps and lighting for the year 1903. It has been possible to erect but eleven (11) electric lights, fifty-two (52) Welsbach lamps and eight (8) open flame gas lamps. This lighting has been done, however, in substitution for lighting which existed at the time, and has in every instance been accomplished with a saving to the City, as well as for a more improved distribution of lighting at the places affected.

The requirements of the Borough in the matter of new lighting as shown by my report under date of October 9, 1903, and which represent some 225 requests received from citizens, and which are on file in this Bureau, show an estimated annual cost of about $42,000.

I would again most respectfully call your attention to the surburban sections of this Borough, which are practically without street lighting, and ask your earnest consideration to light with illuminants suitable to the conditions presented the Flatlands, Canarsie, Gravesend, Kensington, Oak Crest, Kings Oaks, Homewood, Midwood, South Midwood, Home Crest, Sheepshead Bay, Dycker Heights, Bay Ridge, and the greater part of Flatbush.

I am of the opinion that my office force should be increased by an additional Clerk and a Draughtsman; and to properly inspect the Borough, it is necessary that six additional Inspectors of Lamps and Gas should be appointed, in order to have day and night inspections made of the several lighting districts.

The valuable assistance of the employees attached to this Bureau is hereby recognized, as they have served faithfully in the interest of the Department.

Very respectfully,
A. E. ALLEN, Assistant Engineer in Charge of Lighting.

BUREAU OF LAMPS AND LIGHTING.

Report from January 1, 1903, to December 31, 1903.

During the year ending December 31, 1903, there were received in general relation to lamps, lighting, repairs required to same, from citizens, Inspectors and others, 2,851 complaints and requests; of these, 1,403 were received from citizens, and 1,448 from the Departmental Inspectors. Orders were issued to the various light supplying companies in connection with the above complaints to the number of 1,815.

The number of lamps of each kind in service December 31, 1903, is as follows:

Gas lamps, open flame	10,240
Welsbach lamps, gas	4,325
Welsbach lamps, naphtha	393
Electric lights, 1,200 candle power	4,754
Electric lights, 600 candle power	210
Naphtha lamps, plain	12
Total	19,934

The companies supplying street lighting, and the number of lamps maintained by each, are as follows:

Brooklyn Union Gas Company	10,292
Kings County Gas and Illuminating Company	4,273
Flatbush Gas Company	618
Edison Electric Illuminating Company	4,346
Welsbach Street Lighting Company of America	393
New York and New Jersey Globe Gas Light Company	12
Total	19,934

Changes were made as follows in extending the lighting systems during the year:

8 new gas lamps added.
4 gas lamps uncapped and relighted.
31 gas lamps capped and discontinued.
57 new Welsbach lamps added.

2 Welsbach lamps capped and discontinued.
11 new electric lights.
32 electric lights relighted.
33 electric lights extinguished.
4 Welsbach naphtha lamps added.

Showing required repairs to gas lampposts accomplished during the year ending December 31 by the companies, the number of posts set and the number removed:

118 releaded.
144 reset.
72 straightened.
31 new standpipes.
22 new services installed.
13 new columns connected.
12 new posts set.
238 posts removed.

In addition to the above, all the gas lampposts throughout the borough were painted during the year ending December 31, 1903. The putting on of new globes, reglazing and cleaning of lamps, the repairs to and the replacing of stopcocks, the putting on of new burners, much of which kind of work was found necessary to be done, was accomplished upon orders to the various companies.

Statement.

Showing the number of gas lamps, gas Welsbachs, naphtha Welsbachs and plain naphtha lamps burning January 1, 1903; the number of new lamps added, the number of lamps uncapped and relighted, the number capped and discontinued, the number burning December 31, 1903, and the companies supplying the same:

Companies and Kind of Lamp.	Burning Jan. 1, 1903.	New Lamps Added.	Lamps Uncapped.	Lamps Capped.	Burning Dec. 31, 1903.
Brooklyn Union Gas Company, gas	5,993	1	4	25	5,967
Brooklyn Union Gas Company, Welsbach	4,270	56	..	2	4,325
Kings County Gas and Illuminating Company, gas	4,266	7	..	..	4,273
Welsbach Street Lighting Company of America, naphtha Welsbach	389	4	..	..	393
New York and New Jersey Globe Gas Light Company, naphtha	12	..	..	..	12
Total	14,930	68	4	27	14,970

Statement.

Showing the number of electric lights and the candle power of each burning January 1, 1903, the number of new lights added during the year ending December 31, 1903, the number extinguished and discontinued, the number burning December 31, 1903, the companies furnishing same:

Companies.	Candle Power.	Burning January 1.	New Lamps Added.	Lamps Relighted.	Lamps Extinguished.	Burning December 31, 1903.
Edison Electric Illuminating Company	1,200	4,145	14	10	33	4,136
Edison Electric Illuminating Company	600	210	..	..	..	210
Flatbush Gas Company	1,200	609	9	..	..	618
Total	....	4,964	23	10	33	4,964

Statement.

Showing the companies supplying lighting under contract to the borough during the year ending December 31, 1903, and other matters incident thereto:

Companies.	Date of Contract.	Duration of Contract.	Expires.	Unexpired Period.	Prices Current Year.	Candle Power of Lamps.
Kings County Gas and Illuminating Company	Dec. 26, 1889	25 years	Dec. 31, 1914	11 years	$28 00	20
Flatbush Gas Company.	Oct. 3, 1893	15 years	Oct. 3, 1908	5 years	97 50	1,200

Note—The Edison Electric Illuminating Company, the Brooklyn Union Gas Company, the Flatbush Gas Company, the Welsbach Street Lighting Company of America and the New York and New Jersey Globe Gas Light Company have supplied lighting in the Borough during the year ending December 31, 1903. The contracts with these companies expired December 31, 1902, and has not since been renewed. The bills which they submit are at the prices at which under contracts during the year 1902 they supplied lighting.

Statement.

Showing the companies supplying lighting without contract, the prices charged and the candle power of the light supplied:

Companies.	Candle Power.	Prices as Per Submitted Bills.
Brooklyn Union Gas Company	20	$16 00
Brooklyn Union Gas Company	60	31 00
Edison Electric Illuminating Company	1,200	124 10
Edison Electric Illuminating Company	600	62 05
Flatbush Gas Company	1,200	116 80
Welsbach Street Lighting Company of America	60	30 00
New York and New Jersey Globe Gas Light Company	20	22 00

Note—The two prices charged in the Brooklyn Union Gas Company is explained in the fact that one is for the open flame gas lamps, at $16 per lamp per year, and the other for Welsbach lamps, at $31 per lamp per year. In the Flatbush Gas Company the price—$116.80, which is more than in the contract statement above of $97.50—is for special electric lights supplied from conduits and which light the Ocean parkway.

The number of electric lights discovered unlighted and tabulated from Police and Bureau Inspectors' reports, by months, the amount of deductions made therefor from the bills of companies during the year ending December 31, 1903:

Month.	Number of Lamps.	Deductions.
January	436	$132 69
February	652	179 75
March	226	82 54
April	295	74 23
May	185	56 44
June	422	138 72
July	409	148 59
August	590	180 30
September	2,015	650 36
October	833	293 08
November	839	273 70
December	879	298 86
Total	7,831	$2,509 26

The number of gas lamps discovered unlighted and tabulated from the Police and Bureau Inspectors' reports, by months, the amount of deductions made therefor from the bills of the companies during the year ending December 31, 1903:

Month.	Number of Lamps.	Deductions.
January	556	$36 53
February	225	11 94
March	171	12 32
April	91	4 89
May	44	2 40
June	209	8 78
July	98	5 00
August	49	3 20
September	89	4 31
October	259	15 96
November	598	30 90
December	501	31 03
Total	2,841	$167 26

Financial Statement.

The following amounts represent bills audited and forwarded for payment by this Bureau for supply of lighting (gas and electric) and matters incidental thereto, to December 31, 1903:

Brooklyn Union Gas Company—		
For lighting public lamps	$228,709 27	
For lighting public buildings	40,784 73	
For incidental repairs	3,206 00	
		$272,700 00
Kings County Gas and Illuminating Company—		
For lighting public lamps	$119,442 82	
For lighting public buildings	1,601 20	
For incidental repairs	3,138 60	
		124,182 62
Flatbush Gas Company—		
For lighting public lamps	$60,914 57	
For lighting public buildings	22,293 20	
		83,207 77
Welsbach Street Lighting Company of America—		
For lighting public lamps		10,707 50
New York and New Jersey Globe Gas Light Company—		
For lighting public lamps		264 00
Brooklyn Borough Gas Company—		
For lighting public buildings		1,496 90
Bills incidental to lamps and lighting		2,040 41
Total		$494,599 20

RECAPITULATION.

Public buildings	$66,176 03
Public lamps	420,038 16
Incidental expenses	8,385 01
Total	$494,599 20

The above tabulation does not represent the total liability for lighting for the period to December 31; it is only for such bills as have been submitted by the various companies. The Edison Electric Illuminating Company, while continuing to supply lighting, has not submitted bills for audit.

Storehouse Report.

Received at the Department Storehouse from gas companies incident to change in lighting systems:

Fifty square lanterns.
Three hundred and ninety-seven square frames.
One boulevard lantern.
Eight boulevard globes.
Eighteen boulevard frames.
Eight boulevard domes.
One hundred and ninety-four gas lampposts.
Seven butts.
Thirty-eight columns.
Two hundred and sixty-nine street sign frames.
Thirteen old street signs.
Fourteen reflectors.
Thirteen canopies.

Delivered to gas companies for new work, reconstruction and repairs, etc.:

One hundred and forty-four square lanterns.
Four hundred square frames.
One boulevard lantern.
One hundred and sixty-one boulevard globes.
One hundred and thirteen boulevard domes.
Nine boulevard canopies.
Four boulevard frames.
Forty-one gas lampposts.
Two butts.

Seven cocks, stems and burners.
Two green police globes.
One reflector.
Twelve columns.

Showing work accomplished in the matter of repairs to lanterns, frames, etc.:

One thousand and forty-one square lanterns painted and repaired.
One thousand, five hundred and thirty-one square frames painted and repaired.
One thousand and eighty-three boulevard frames painted and repaired.
Six hundred and fifteen street signs (frames).
Three hundred and forty-one canopies.

Stock on hand at Department Storehouse December 31, 1903:
One hundred and sixty-seven gas lamp-posts.
Thirty-five butts.
Six hundred and fifty-two lantern frames (boulevard).
One thousand one hundred and seventy lantern frames (square).
One thousand and three lanterns (square).
Three hundred and eight canopies.
One hundred and three globes.
Two hundred and thirty-five reflectors.
Fifty-one domes.
One hundred and forty cocks and stems.
Seventy-two uprights.
Twenty police globes.
Twenty police globe canopies.
Five hundred and thirty-six street sign frames.
Three hundred and fifty-eight collars for sign frames.

Table showing the gas mains of various sizes, laid by the several gas companies during the year ending December 31, 1903—total in miles, and the mileage of lighting:

Brooklyn Union Gas Company.

4-inch main	12,068 feet	
6-inch main	38,466 feet	
8-inch main	5,206 feet	
12-inch main	3,215 feet	
14-inch main	290 feet	
16-inch main	10 feet	
20-inch main	17,856 feet	
24-inch main	712 feet	
Total	77,823 feet	14 miles, 3,903 feet
Kings County Gas and Illuminating Co.	1,427 feet	1,427 feet

Total miles of main laid to December 31, 1903.....14 miles, 5,330 feet
Total miles of lighting in the Borough to December 31, 1903, 586.75.

The following list shows the locations at which Welsbach lamps were installed and lighted during the year ending December 31, 1903:

Twelfth street, north side, between Fourth and Fifth avenues	2
Graham avenue, between Jackson and Withers streets	1
Debevoise street, between Graham avenue and Humboldt street	1
Fifty-ninth street, between Fifth and Sixth avenues	6
Williams avenue, between Liberty and Atlantic	2
Park Place, between Fifth and Sixth avenues	6
Warren street, between Fourth and Fifth avenues	5
St. Mark's place, between Fourth and Fifth avenues	6
Fourth street, between Smith and Bond	7
Luquer street, between Smith street and Hamilton avenue	9
Steuben street, between Myrtle and Willoughby avenues	5
Clymer street, between Wythe and Bedford avenues	5
Clymer street, between Bedford and Lee avenues	2
	57

The following list shows the locations of electric lights, which were erected and lighted during the year ending December 31, 1903:

Hoyt street between Fulton and Livingston street	1
Oakland street, east side, north of Ash street	1
Beverly road, corner of East Fifth street	1
Lots lane, northwest corner Forty-third street	1
Lots lane, northeast corner Forty-fourth street	1
East Thirty-second street, between Grant street and Church avenue	1
Flatbush avenue, between Washington place and Grant street	5
	11

The following list shows the locations of electric lights extinguished and discontinued during the year ending December 31, 1903:

Sackett street, south side, east of Hoyt street	1
Manhattan avenue, west side, at Vernon avenue bridge	1
Park place, opposite No. 22 and No. 57	2
St. Mark's place, No. 92 and No. 120	2
Warren street, No. 625	1
Luquer street, No. 155 and No. 195	2
Fourth street, No. 20 and No. 39	2
Opposite No. 131 Steuben street	1
Southeast corner Nostrand avenue and Montgomery street	1
Around the Lake, Prospect Park	10
Rose Garden, Prospect Park	2
Clymer street, opposite No. 104, No. 123, No. 169	3
Flower Garden, Prospect Park	1
Henry street, in front of St. Peter's Hospital	1
Willink entrance, Prospect Park	2
Atlantic avenue, near Carlton	1
	33

The following list shows the locations of electric lights relighted during the year ending December 31, 1903:

Around the Lake, Prospect Park	10

The following list shows the locations of Welsbach naphtha lamps installed and lighted during the year ending December 31, 1903:

Opposite tunnel, Prospect Park	2
Flower Garden, Prospect Park	2
	4

The following list shows the locations of new gas lamp-posts set, connected and lighted; also locations of gas lamps uncapped and relighted during the year ending December 31, 1903:

Sixteenth avenue, between Forty-fifth and Forty-seventh streets (new)	5
Forty-fifth street, between Sixteenth avenue and Old New Utrecht road (new)	4
Seventh street, between Sixth and Seventh avenues (new)	1
Hawthorne street, north side, first east of Rogers avenue (uncapped)	1
Macon street, between Saratoga avenue and Broadway (uncapped)	3
	12

REPORT FOR THE YEAR 1903

BOROUGH OF BROOKLYN.

Office of Supplies and Accounts.

Mr. ROBERT VAN IDERSTINE, Deputy Commissioner:

Dear Sir—I beg to transmit herewith a report of the work of this office for the year 1903:

The office was organized in December, 1902, for the purchase of supplies, the preparation of vouchers for payment and the keeping of the accounts of the Department, which work had been distributed among the different bureaus prior to that time.

Supplies.

When supplies are required by any of the bureaus, requisition is made on this office. If the cost would amount to $1,000 or over, a contract is prepared and awarded at public letting. When the amount would be less than $1,000, invitations to bid are sent to nine or ten firms dealing in the particular class of supplies required, preference being given to manufacturing firms. After the bids are opened they are canvassed by items and an order issued to the lowest bidder on each individual item, provided the prices named are reasonable. An indexed record of prices paid for supplies since January 1, 1902, has been prepared, and is one of the means used in comparing prices. Eighteen hundred and eighty-seven orders have been issued.

Inspection of Supplies.

Previous to this year there had been no systematic inspection of supplies, the work usually devolving upon the person in charge of the station or yard where the supplies were delivered.

On January 1 an Inspector of Supplies was appointed and assigned to this office. The heads of bureaus were then notified that packages containing supplies were to be opened only when the Inspector was present. He is provided with a copy of each contract and of each order for supplies, and it is his duty to see that all materials furnished conform to specifications and that the required quantities are delivered. All bills for supplies must bear his certificate as to correctness of quantity, quality and price.

Bills.

All bills for supplies ordered by the Department are first compared with their respective order or contract; then passed to the Inspector for his certificate; next sent to the bureau from which the original requisition emanated, for the signatures of the party receiving the supplies and the chief of bureau; then given to the Bill Clerk, who prepares vouchers in triplicate, two of which are transmitted to the Commissioner and one filed in this office.

Each bill is stamped with date when received, and at each successive stage in its course of receiving signatures.

The cause of any delay in the passing of a bill for payment can thus be easily located, and the blame, if any, placed where it belongs.

Two thousand one hundred and forty-nine bills, amounting to $1,725,333.86, have been passed for payment.

Payrolls.

All payrolls are now prepared in this office. Formerly this work was done in the different bureaus, each bureau being responsible for its own roll. In connection with the payrolls there is kept a card index of employees, showing name, position, rate of pay, days absent, etc. Each Foreman or person in charge of employees reports in writing to this office daily, naming those who are absent, and an entry is made on the card of each absentee. A list of names of those on monthly payrolls who have been absent three days or more during the month is then prepared for you, with a record of their previous absences during the year.

448 payrolls, amounting to $838,349.44, have been forwarded to the Commissioner.

Contracts.

The original contracts being retained in the Commissioner's office, copies are made for your file, for the Bureau which has supervision of the work to be done, and for this office.

The Contract Payment Book contains a record of payments, percentage retained, work done, etc., and shows the financial status of each contract at any particular time.

The following contracts have been executed for year 1903:

Date.	Title.	Estimated Cost.
Feb. 18, 1903	Water mains	$133,934 60
Feb. 26, 1903	Semi-bituminous coal	35,690 00
Mar. 4, 1903	Anthracite coal	79,518 60
Mar. 5, 1903	Unloading coal	13,891 50
April 24, 1903	Nozzle case hydrants	11,530 00
May 12, 1903	Steam packing	1,724 80
June 9, 1903	Filter controllers	3,495 00
June 23, 1903	Anthracite coal	231,255 00
June 26, 1903	Retubing Morris boilers	5,498 00
June 26, 1903	48-inch trunk water main	236,750 00
June 27, 1903	Remodeling Wantagh Pumping Station	130,285 00
July 1, 1903	36-inch water main (Atlantic avenue)	24,938 50
July 9, 1903	Semi-bituminous coal	88,868 50
July 16, 1903	48-inch force main	422,247 50
July 28, 1903	Filter beds—Hempstead	9,120 00
July 29, 1903	Lubricating and illuminating oils	3,572 70
Aug. 24, 1903	Filter beds—Rosedale	50,000 00
Sept. 1, 1903	Sleeves and gates	5,325 66
Sept. 18, 1903	Removing water mains	213,626 15
Sept. 18, 1903	Trunk water mains	60,302 50
Sept. 21, 1903	Hay, oats, etc	746 48
Sept. 21, 1903	Sulphate of alumina	1,254 00
Sept. 30, 1903	Caulking lead and yarn	720 30
Oct. 12, 1903	Laboratory supplies	995 38
Oct. 17, 1903	Metals	1,428 30
Oct. 19, 1903	Paint supplies	599 75
Oct. 21, 1903	Water mains	111,817 00
Oct. 24, 1903	Hardware	1,434 81
Oct. 28, 1903	Lumber	1,875 70
Oct. 30, 1903	Pipe and castings	23,759 40
Nov. 11, 1903	Stop-cocks	5,313 00
Dec. 10, 1903	Cast iron pipe and castings	14,080 50
Dec. 23, 1903	Cast iron pipe and castings	81,430 12
Dec. 12, 1903	16-inch trunk water main	77,398 00

Accounting.

A complete card ledger has been installed, making it possible to ascertain almost instantly the condition of any account.

In addition to the principal accounts of Appropriations, Water Revenue and Special Funds, separate accounts are kept showing the cost of operation of each bureau or office, cost of maintenance of each pumping station, reservoir, repair yard, etc., and the expenditures on each work of construction.

Besides the foregoing there has been the usual work incidental to an accounting office, such as preparation of statements, indexing of voucher, requisition and letter books and the care of duplicate vouchers.

This office is also charged with the care of the records of the Department of City Works of the former City of Brooklyn. They are occasionally called for, but being in a small dark closet, they are rather difficult of access. If we are to be responsible for them, I would recommend that provision be made for filing them in a suitable place.

Appended hereto is a statement of the receipts and expenditures of the Department in this borough for the twelve months ending December 31, 1903.

Respectfully,
J. J. FLANNERY,
In Charge Office of Supplies and Accounts, Room 45.

Statement of Receipts and Expenditures from January 1, 1903, to December 31, 1903, Inclusive.

Receipts.

Regular water rates	$1,548,901 09
Metered water rates	871,181 24
Default water rates	20,916 48
Building purposes	20,543 44
Permit to tap mains	13,217 25
Miscellaneous receipts	2,944 31
Total	$2,477,703 81

Collected in Bureau of Assessments and Arrears	131,615 50
Collected by Deputy Receiver of Taxes	78,100 93
Total receipts	$2,687,420 24
Refund of payments	4,602 71
Net receipts	$2,682,817 53

Expenditures.

Appropriation Accounts—	
Lamps and Lighting, 1901	$32 99
Lamps and Lighting, 1902	118,193 12
Rentals of Fire Hydrants, 1902	6,250 00
Supplies and Contingencies, 1902	1,300 58
Salaries—Office Deputy Commissioner, 1903	11,355 42
Salaries—Office Chief Engineer, 1903	1,850 00
Salaries—Office Water Register, 1903	63,861 97
Salaries—Office Laboratory, 1903	7,339 12
Salaries—Lighting and Electricity, 1903	33,346 13
Lamps and Lighting, 1903	414,135 51
Rentals of Fire Hydrants, 1903	18 750 00
Supplies and Contingencies, 1903	5,832 62
Water Revenue Accounts—	
M. & R.—Materials and Supplies, 1898	5,510 29
M. & R.—Materials and Supplies, 1899	1,931 39
M. & R.—Materials and Supplies, 1900	367 64
M. & R.—Materials and Supplies, 1901	2,391 60
Maintenance and Distribution of Water Supply, 1902	143,256 50
Maintenance and Distribution of Water Supply, 1903	1,077,017 65
Special Fund Accounts—	
Brooklyn Water Construction	19,962 21
Water Construction, Brooklyn	117,266 48
Water Main Fund	67,110 89
Water Fund	424,948 81
Atlantic Avenue Improvement Fund	21,521 30
Water Meter Fund	151 08
Total expenditures	$2,563,683 30

"IV."

Annual Report to the Honorable Robert Grier Monroe, Commissioner of the Department of Water Supply, Gas and Electricity, of the condition of gas and electric lighting in the Boroughs of Manhattan and The Bronx, from Charles F. Lacombe, Engineer of Surface Construction, Bureau of Lamps and Gas.

Department of Water Supply, Gas and Electricity,
Bureau of Lamps and Gas,
Office of Engineer of Surface Construction, in Charge.
New York, December 31, 1903.

Hon. ROBERT GRIER MONROE, Commissioner:

Dear Sir—A report of the transactions of the Bureau of Lamps and Gas for the Boroughs of Manhattan and The Bronx, is herewith submitted, for the quarter ending December 31, 1903, and for the year ending the same date.

A brief history of the events of the year in the Bureau follows:

After the death of the late Superintendent of Lamps and Gas, Mr. Stephen McCormick, in 1902, the office of Superintendent of Lamps and Gas was abolished. The Bureau remained in the charge of Mr. Thomas F. Adriance, Engineering Inspector in Charge, until my appointment by you in January, 1903. As soon thereafter as possible a general investigation of the affairs of the Bureau was begun. Among the first things taken up were the bids for lighting The City of New York in its streets and public places for the year 1903. Returns were obtained, and comparisons made with the cost of lighting of a similar character for about one hundred other cities of considerable size throughout the United States, and the matter culminated when, on March 12, a report was submitted to the Board of Estimate and Apportionment, advising that all bids be rejected. In this report a recommendation was made that the question of municipal ownership of an electric light plant, only, should be taken up by The City of New York, and on being authorized to do so, Dr. Cary T. Hutchinson was retained. Dr. Hutchinson made a report, a copy of which is attached and marked Exhibit "A," giving the cost of installation and the cost of maintenance—

First—For a plant capable of supplying the present lighting.

Second—A plant capable of supplying the requirements of the City for the next five years.

On the showing that was made by this report, The City of New York made an application to the Legislature for power to build such a plant, if deemed advisable by the Board of Estimate and Apportionment. The Legislature adjourned without passing such authorization. The matter was finally reported again to the Board of Estimate and Apportionment and referred to a Special Committee.

The Board of Estimate and Apportionment, upon the recommendation of the Special Committee, on December 4 rejected bids of all the lighting companies for the year 1903, except that of the New Amsterdam Gas Company for open flame gas lamps at $12 per annum.

While this investigation was going on a careful examination was being made of the condition of lighting in the boroughs of Manhattan and The Bronx, the methods of inspection in force, and the method of operation of this Bureau, the results of which are shown later.

As the bids were not accepted for the year 1903, it was necessary that some arrangement be made by which lights could be added as it became absolutely necessary throughout the year. After some discussion this was finally arranged under what was termed a "Provisional Permit." All the gas and electric companies lighted lamps as requested under these permits. A considerable number of gas lamps have been changed from open flame to mantle lamps, new mantle lamps and a number of additional arc lights were also permitted installed.

A much closer method of inspection has been put in force and has proved satisfactory to date. A stricter examination was made of the total charges against the City for lighting; a considerable mass of valuable statistics in this regard has been obtained and is now on file for reference in future years. These statistics had not been collected before and were particularly lacking in any record giving the lighting in public buildings by electricity and by gas. A careful count of the lights in these buildings has been made and is now on file, giving in detail the buildings and the number of each kind of lights installed in each, as well as the number of hours burned per month, and cost of same for each building. The number of outages of street lamps reported by the Inspectors has increased very largely and the number of repairs performed has also increased. It was found that the gas lamps were not in good condition. The cost of repairs has been large this year, but if the expense had not been incurred now, the lamp-posts and appliances would have gotten in such a bad condition that the City would have had to renew a large part of its equipment.

After nearly a years investigation it was found that the following statement should be made to show the condition of lighting affairs in the boroughs of Manhattan and The Bronx, the improvements recommended, the limitations of this Bureau, and also the changes which seem necessary in order to put the Bureau in a proper state of efficiency.

The bids for all public lighting for the year 1903 have been rejected and the matter of adjustment of claims is in the hands of the Comptroller.

The estimated expense, according to the rejected bids and the unadjusted monthly bills presented by the gas and electric companies, is as follows:

Estimated Expenditure of Lighting the Boroughs of Manhattan and The Bronx.
(December 31, awaiting Comptroller's Adjustment.)

Actual lighting, streets	$1,242,356 34
Public buildings, vouchered	217,920 00
Public buildings, not vouchered	1,229 51
*Board of Education	138,268 44
Repairs to equipment in lighting service	18,923 05
Erection of new lamps	1,612 00
Expenses of Bureau—	
Salaries paid Inspectors, etc., from Lamps and Lighting appropriation	12,229 37
Expense for repairs to other departments, automobile, and reports on municipal plant	3,515 74
Routine expense, gas examinations, rents, repairs, cartages, traveling expenses	5,248 50
Contract supplies for street lamps received and vouchered	11,719 78
Contract supplies not yet received	6,108 72
Orders not yet billed and to be vouchered	1,950 00
	$1,661,081 45
*No transfer was received to pay this by this Department and it is not vouchered—less Board of Education	138,268 44
Total estimated expenditure from appropriation for Lamps and Lighting	$1,522,813 01
Salaries of Inspectors, etc, paid from appropriation "Salaries—Lighting and Electricity"	12,369 60
Total with salaries	$1,535,182 61
Chief Engineer's salary from appropriation for "Salaries—General Administration"	2,830 64
Total	$1,538,013 25

A list of all the lamps in service December 31, 1903, is given herewith, with the annual bid price of each and the total amount for these lamps for the ensuing year. This list comprises all the lamps now in service.

Manhattan.

Company.	Style of Lamp C. P.	Number of Lamps.	Bid Price Per Year.	Cost Per Year.
Gas.				
New Amsterdam	Ordinary	3,402	$12 00	$40,824 00
Standard	Ordinary	1,751	13 04 1-3	22,838 88
* Consolidated	Ordinary	8,798	17 50	153,695 00
Consolidated	Single W.	5,062	29 00	146,798 00
† Consolidated	Double W.	16	47 00	752 00
Total Gas		19,029		$364,907 88
Naphtha.				
New York and New Jersey Gas	Ordinary	107	22 00	$2,354 00
Welsbach Street Lighting Company	Welsbach	754	30 00	22,620 00
Total Naphtha		861		$24,974 00
Electric.				
Edison Incorporated	25 c. p.	56	22 50	$1,260 00
Br. Ed. United	2,000 c. p.	2,689	146 00	392,594 00
Brush—½ yr. 12 p. m.	2,000 c. p.	4	102 20	204 40
Edison	900 c. p.	16	102 20	1,635 20
Edison, twin	1,800 c. p.	206	182 50	37,595 00
Total Electric		2,971	Plus 23 Free	$433,288 60
Total Manhattan		22,861	Plus 23 Free	$823,170 48

* Open flame lamps, 13,951; gas cost, $217,357.88.
† Welsbach, 5,078; gas, $147,550.

The Bronx.

Company.	Style of Lamp C.P.	Number of Lamps.	Bid Price Per Year.	Cost Per Year.
Gas.				
Central Union	Ordinary	1,974	$22 00	$43,428 00
Northern Union	Ordinary	3,331	24 00	79,944 00
Westchester Lighting Company	Ordinary	343	24 00	8,232 00
Total Gas		5,648		$131,604 00
Naphtha.				
New York and New Jersey Gas	Ordinary	1,332	22 00	$29,304 00
Welsbach Street Lighting Company	Welsbach	100	30 00	3,000 00
Total Nephtha		1,432		$32,304 00
Electric.				
Ed. & West. Inc.	25 c. p.	380	25 00	$9,500 00
Br. G. & E.	1,200 c. p.	651	125 00	81,375 00
Ed. & West.	2,000 c. p.	1,277	146 00	186,442 00
Total Electric		2,308	Plus 1 Free	$277,317 00
Total Bronx		9,388	Plus 1 Free	$441,225 00
Total Manhattan and Bronx		32,249	Plus 24 Free	$1,264,395 48
Electric street signs, June to December, 144 at $12, seven months				1,848 00
				$1,266,243 48

Summary.

	Open Flame.	Welsbach.	
Manhattan.			
Gas	13,951	5,078	19,029
Naphtha	107	754	861
	14,058	5,832	19,890
Bronx.			
Gas	5,648	.....	5,648
Naphtha	1,332	100	1,432
	6,980	100	7,080
Manhattan and Bronx	21,038	5,932	26,970

Electric.

	I 25.	A 900.	A 1200.	A 2000.	
Manhattan	56	428	....	2,693	Plus 23 Free
Bronx	380	....	651	1,277	Plus 1 Free
	436	428	651	3,970	Plus 24 Free
			3,970		
			428		
			436		
			5,485	Plus 24 Free	= 5,509
Deduct in order to count 428 double or twin lamps as single...			206		
			5,279	Plus 24 Free	= 5,303
Manhattan and Bronx gas and naphtha lamps				26,970	
Manhattan and Bronx electric lamps				5,279	Plus 24
Manhattan and Bronx, all lamps				32,249	Plus 24
Grand total				32,273	

The specifications under which these lamps were bid for contain the following conditions:

The 2,000 candle power arc lamps are required to consume 425 watts between carbons.

They are required to burn 3,950 hours.

All maintenance of every description is supplied by the companies and also all the equipment necessary to furnish the light.

Contracts when made are for a period of one year.

The energy required for a 1,200 candle power lamp is 320 watts between carbons.

The energy required for a 900 candle power lamp is 230 watts between carbons.

Most of the 900 candle power arc lamps used by the City are those in use on Fifth and Madison avenues as "twin" arc lamps, i. e., two arc lamps on one pole. There are, of course, really 412 lamps erected as twin lamps, although billed as 206 lamps, with one bid price per two lamps.

Incandescent lamps are required to be of 25 candle power and to burn for 4,000 hours per annum, all maintenance and equipment being supplied by the companies supplying current.

The specifications of the gas lamps furnished are as follows:

All gas lamps burn 4,000 hours.

Open-flame gas lamps are specified to be supplied with 20 candle power gas at a pressure of one inch, and are required to burn three cubic feet per hour, and they give an actual candle power of about twelve.

The lamp-posts and lanterns are supplied by The City of New York and burning appliances by the company.

Mantle gas lamps are required to furnish 60 candle power when supplied by 20 candle power gas. The company furnishes the lanterns and burning appliances and the City furnishes the lamp-posts.

In the case of gas lamps the company furnishes the maintenance, lighting, cleaning and extinguishing, as well as gas.

Naphtha lighting is specified as follows:

Open-flame naphtha lamps are required to give the same candle power as an open-flame gas lamp when supplied with 20 candle power gas at one inch pressure, and at the rate of three cubic feet per hour.

Mantle naphtha lamps are required to give 60 candle power.

The entire equipment of both these styles of lamps belongs to the company, which furnishes illuminant, lighting, cleaning, extinguishing, maintenance and burning appliances.

Under previous contracts the companies were obliged to lay mains, supply street lamps when requested, to light and extinguish the lamps by schedule furnished by this Department, and were in general under its supervision as to the performance of contract.

The City of New York furnishes certain supplies for the repair of lamps and lamp-posts free to the companies. They put them up without expense, but charge the City for the labor of repairs to existing lamp-posts, erection of new lamp-posts and removal old ones. The supplies furnished by the City are:

Lamp-posts, square lanterns, boulevard globes, crossheads, lamp irons, boulevard tops, boulevard reflectors, miner lamps, miner lamp globes, fire-alarm lanterns, police globes, brackets of different types, bridge lamp globes, tops and reflectors.

History of Lighting in New York.

Gas lamps were first put in in 1823, with practically the same equipment and under the same specifications as are now in use, although the City has long since outgrown the illumination given by the ordinary open-flame gas and naphtha lamps. The rates of both gas and electric street lamps from the year 1858 and from the year 1881, respectively, are shown in the attached Exhibit "B," giving the cost and changes of cost from then to date. It will be noted that in Manhattan the rate steadily increased from 1858 to 1869. It remained stationary until 1872, when it began to diminish and decrease up to 1880. It began again to rise in 1881. and the present price, $17.50, which the City pays for the larger number of gas lamps in Manhattan, began in 1882. In 1885 the Equitable Company began business, and furnished light, as required by its franchise, at $12 per lamp per annum.

In 1889 the Standard Gas Company began furnishing light, as required by its franchise, at $12.50 per lamp per annum. plus 54 1-3 cents for additional hours of burning in excess of the time stated in its franchise.

In The Bronx gas lighting was begun about 1874, and the bid price steadily decreased to date.

Electric lighting was first begun in Manhattan in 1881, and the rate decreased until 1890, when we meet the bid price of $146 for a single 2,000 candle power lamp. This bid price has practically remained unchanged to date.

Electric lighting in The Bronx was first begun in 1887, and apparently was discontinued in the years 1889 and 1890, beginning again in 1891, with an increased price which held until 1897, when part of the lights were supplied at $146, which bid price, as will be noted, has practically prevailed throughout Manhattan and The Bronx ever since.

In regard to the above prices, only 2,000 candle power arc lamps are referred to; the other prices as shown apply to 1,200 and 900 candle power lamps, and incandescent lamps of 25 candle power.

Public Building Lighting.

The City of New York pays for the lights in its various buildings—about 600 in number. The total number of lamps installed in Manhattan and The Bronx, in these buildings, is about 90,000 gas lamps and 70,000 electric lamps. The price bid for the supply of gas to gas lamps in public buildings is 90 cents per thousand cubic feet, net, except in two instances in The Bronx, where it is respectively $1 and $1.10, but the consumption is comparatively so small that these two instances are negligible.

The bid price of current supplied to electric incandescent lamps in public buildings in Manhattan and The Bronx, is as follows:

The bids for 1903 are, in the case of the New York Edison Company, 12 cents per kilowatt hour, or when the total installation of any one building consumes 2,000 kilowatt hours per month, and also uses its entire installation at least two hours every day, the price bid is 10 cents for the first three hours' use, and 5 cents for the balance.

The United Electric Light and Power Company makes the same bid for the supply of current to the buildings it furnishes.

The New York Edison Company in The Bronx bids 15 cents for the first two hours' use, 10 cents for the third and fourth hours' use, and 5 cents for anything over four hours. If a building consumes 2,000 kilowatt hours a month, and uses its entire installation two hours every day, it bids 10 cents for the first three hours and 5 cents for any use over three hours.

These are the bids of 1903, but in all cases the billing is not in exact accord with these bids, except in the case of the New York Edison Company in The Bronx.

All the above bids also include a discount of 10 per cent. in the case of bills running over $1,000, and 5 per cent. in the case of bills running over $500 in any one building for a period of one month.

The grand majority of installations are charged for at the higher rates, as the lower rate is so difficult to obtain that only three installations in the City fairly earn it. At this date these installations are:

North Brother Island.
Bellevue Hospital.
Police Headquarters.

There are probably some buildings under the Board of Education which also earn this rate, but as this Bureau has not taken charge of the lighting of the Board of Education, it is impossible to give detailed information.

The reason why most of the buildings cannot obtain the lower rate is that many lamps are very rarely used so that the consumption does not amount to 2,000 kilowatt hours per month, and when it does amount to this, it does not equal two hours' use of the entire capacity installed, every day for eight months in the year. This raises the requirement to such a point that, except in three buildings, it is never reached.

Comparison of Prices of Lighting New York with Prices Paid in Other Cities.

In the report of March 12 to the Board of Estimate and Apportionment, the price New York has paid is very much higher than any of the other cities quoted. The average price for 2,000 candle power lamps of sixty-eight cities is $88.60. For 22 cities for 1,200 candle power lamps the average price is $81.80.

In the time we had to get up this table and make a report a general statement only could be made. That statement showed that the cost of lights in New York was much higher than elsewhere. It was claimed, however, that in a large city like New York, under more exacting conditions, longer hours of burning, additional investment due to underground wires, and so on, that a fair comparison could not be made. Since that time we endeavored to obtain full data from thirty-six of the larger cities in the country. This resulted in obtaining much detailed information from the cities of St. Louis, Chicago, Cincinnati, New Orleans, Providence, Boston, Baltimore, Washington, Philadelphia and Cleveland, and a limited amount of information from Detroit, Milwaukee, Louisville, Jersey City, Newark, Los Angeles and Pittsburg.

The compiled data of these different cities, given in the same order to compare with New York, are shown in Exibit "C" attached to this report.

It is hard to give an exact comparison without writing out at length the various conditions and explanations bearing on the lighting in these different cities. This has been done and is shown in this Exhibit, but a table has also been prepared and inserted here, comparing the more prominent requirements which one would suppose would tend to determine the price of lighting, namely:

1. The term of contract in years.
2. Total number of 2,000 candle power lamps.
3. The hours burned.
4. The energy required per lamp.
5. The price of fuel.
6. The price per kilowatt hour of electric current supplied for lighting public buildings.
7. The number of lamps served by underground wires.
8. The percentage of lamps served by underground wires.
9. The price and comparison of gas and naphtha street lamps.
10. The cost of conduit per duct mile, and rentals charged by the cities which have built their own conduits and rent them to other customers.
11. The price of gas per thousand cubic feet supplied for use of public buildings.

And finally a comparison of the prices of light in these cities.

12. For 2,000 candle power lamps when served by underground wires, and
13. For 2,000 candle power lamps when served by overhead wires.

In all cases, whether these cities have a municipal plant or not, the only price given is for the lights they rent per annum.

Term of Contract in Years.		
No. 1	10 years	St. Louis.
		Cincinnati.
		New Orleans.
No. 2	6 years	Providence.
No. 3	5 years	Boston.
		Baltimore.
		Milwaukee.
		Newark.
		Jersey City.
No. 4	4 years	Louisville.
No. 5	1 year	New York.
		Philadelphia.
		Cleveland.
		Washington.
		Chicago.
		Los Angeles.
		Pittsburg.

Number of Lamps, 2,000 Candle Power.			
No. 1	Philadelphia	9,282	
No. 2	Chicago	5,308	
No. 3	New York (Manhattan and Bronx)	4,196	4,867
No. 4	Boston	3,670	
No. 5	Pittsburg	2,835	
No. 6	Detroit	2,113	
No. 7	Providence	2,074	
No. 8	Newark	1,950	
No. 9	Milwaukee	1,812	
No. 10	Louisville	1,758	
No. 11	New Orleans	1,665	
No. 12	Baltimore	1,625	
No. 13	Jersey City	1,402	
No. 14	Cleveland	1,098	
No. 15	Los Angeles	1,050	
No. 16	St. Louis	968	
No. 17	Washington	965	

	Hours Burned.	
No. 1	Detroit	3,744
No. 2	Cleveland	3,760
No. 3	Cincinnati	3,819
No. 4	Boston	3,828
No. 5	Chicago	3,900
	New Orleans	3,900
	Louisville	3,900
	Los Angeles	3,900
	Milwaukee	3,900
	Pittsburg	3,900
No. 6	New York	3,950
No. 7	Jersey City	3,983
No. 8	Providence	4,000
	Baltimore	4,000
	Chicago	4,000
	Newark	4,000
No. 9	St. Louis	4,055
No. 10	Philadelphia	4,095

	For 2,000 Candle Power Lamp, Energy Required Between Carbons.	
No. 1	New York	425 watts
No. 2	Philadelphia	450 watts
	New Orleans	450 watts
	Washington	450 watts
	Chicago	450 watts
	Providence	450 watts
No. 3	Cleveland	440-480
No. 4	Boston	464 watts
No. 5	Baltimore	480-462
No. 6	St. Louis	480 watts

	Price of Coal Per Ton.	
No. 1	St. Louis	$1 90
No. 2	Cincinnati	2 00
	Louisville	2 00
No. 3	Cleveland	2 50
	New Orleans	2 50
No. 4	Newark	2 75
	Philadelphia	2 75
	Jersey City	2 75
No. 5	Chicago	3 00
	New York	3 00
	Washington	3 00
	Baltimore	3 00
No. 6	Boston	3 09
No. 7	Milwaukee	3 50
No. 8	Providence	3 90

	Price Per Kilowatt Hour, Public Buildings—Electric.	
No. 1	Boston	$0 16
No. 2	Cleveland	12½
No. 3	New Orleans	12
No. 4	New York	9 96-100
No. 5	St. Louis	7½ to 8
No. 6	Milwaukee	7
No. 7	Baltimore	6 3-10
No. 8	Washington	6
	Philadelphia	6
	Providence	6

	Number of Lamps, Underground Wires.	
No. 1	New Orleans	50
No. 2	Cleveland	109
No. 3	Baltimore	180
No. 4	Milwaukee	200
	Newark	200
No. 5	Providence	272
No. 6	St. Louis	328
No. 7	Philadelphia	850
No. 8	Cincinnati	920
No. 9	Washington	965
No. 10	Boston	1,453
No. 11	Chicago	1,754 *1,940
No. 12	New York	2,856

* Estimated.

	Per Cent. of Lamps on Underground Wires.	
No. 1	New Orleans	3.0
No. 2	Philadelphia	9.15
No. 3	Cleveland	10.0
No. 4	Newark	10.2
No. 5	Milwaukee	11.03
No. 6	Baltimore	11.07
No. 7	Providence	13.1
No. 8	Cincinnati	21.1
No. 9	St. Louis	32.8
No. 10	Chicago	33.4 *36.5
No. 11	Boston	39.5
No. 12	New York	56.08
No. 13	Washington	99.0

	Price of 1,000 Cubic Feet—Public Buildings—Gas.	
No. 1	St. Louis	$1 00
	Baltimore	1 00
	Washington	1 00
	Chicago	1 00
No. 2	New York	0 90

	Price of 1,000 Cubic Feet—Public Buildings—Gas.	
No. 3	Boston	$0.875
No. 4	Cleveland	.75
No. 5	Cincinnati	.726
No. 6	Louisville	.70
No. 7	Philadelphia	Free

Gas and Naphtha Lighting on Streets.

	No. Street Open Flame Gas Lamps in Use.	Cubic Feet Consumed Per Burner Hour.	Price for Same.	No. Mantle Lights in Use.	Price for Same.	Mantle Naphtha Lamps.	Price for Same.	Open Flame Naphtha Lamps.	Price for Same.
Philadelphia	20,678	5	Free	None	....	5,411	$29 50	7,076	$21 50
St. Louis	None	....	....	10,139	$28 00	None	....	None	....
Boston	All mantle	....	....	9,248	30 00	440	30 00	1,658	22 81
Baltimore	All mantle	....	....	6,174	21 40	1,109	23 45	None	....
Cleveland	All mantle	....	....	5,452	24 56*	2,476	22 37	None	....
Cincinnati	1,054	4*	$18 99	1,237	....	None	....	762	15 95
New Orleans	None	....	....	None	....	None	....	None	....
Washington	6,989	5	20 00	500	25 00	None	....	1,244	18 00
Chicago	13,895	5*	19 25	11,172	20 30	None	....	6,146	....
New York—Man-	2,965	3*	12 00	5,168S	29 00	757	29 00	107	22 00
hattan and The	1,578	....	13 04	1-3	....	....	....	....	....
Bronx	8,422	....	17 50	16D	47 00	204	30 00	1,349	22 00
	1,973	....	22 00	....	....	....	....	....	....
	3,331	....	24 00	....	....	....	....	....	....
	342	....	24 00	....	....	....	....	....	....
Providence	....	....	....	793	30 00	....	....	....	....

***Lamps and posts repaired at City's expense.**

Cost Conduit per Duct Mile and Rental Charged by Cities, Including Manholes and Paving.

		Rental.				Rental.
No. 1	St. Louis	$1,000 00		No. 5	Detroit	$1,716 00	$264 00
No. 2	Baltimore	1,182 72	$300 00	No. 6	Chicago	1,863 94	
No. 3	Philadelphia	1,200 00	250 00	No. 7	Boston	3,000 00	Estimated
No. 4	Washington	1,400 00		No. 8	New York	Unknown	900 00

Comparison of Cost of 2,000 Candle Power Lamps in Various Cities.

	Price 2,000 Candle Power Lamps on Underground Wires.	
No. 1	New York	$146 00
No. 2	Chicago	137 50
No. 3	Boston	120 45
No. 4	Philadelphia	110 56
No. 5	Providence	109 50
No. 6	Baltimore	99 92
No. 7	Milwaukee	99 00
No. 8	St. Louis	96 38
No. 9	Newark	95 00
No. 10	New Orleans	90 00
No. 11	Washington	80 00
No. 12	Cleveland	75 00

	Price 2,000 Candle Power Lamps on Overhead Wires.	
No. 1	New York	*$146 00
No. 2	Boston	120 45
No. 3	Philadelphia	110 56
No. 4	Providence	109 50
No. 5	Chicago	103 00
No. 6	Baltimore	99 92
No. 7	Jersey City	97 50
No. 8	St. Louis	96 38
No. 9	Pittsburg	96 00
No. 10	Newark	95 00
No. 11	Louisville	84 00
No. 12	Milwaukee	81 00
	Los Angeles	81 00
No. 13	New Orleans	75 00
	Cleveland	75 00

*Smaller candle power, $125 and $102.20.

It will be noted that New York, under the law, does not contract for over one year.

New York ranks third in the number of lights in use.

In the hours of burning New York is very near the average.

New York has more lamps underground than any other city, but in the percentage of lamps underground, compared to the total number of lamps, New York has 56 per cent., whereas Washington has about 99 per cent.

The percentage of lamps underground in Chicago and Boston is a little less than New York's percentage.

In the cost of fuel New York is about the average.

The price of electric current to public buildings in New York is above the average. This, in the case of New York, is the actual average derived from the bills and not from the bids.

In gas per thousand cubic feet, New York ranks next to the cities paying the higher prices.

In gas street lamps New York requires only three cubic feet of gas per hour, against five cubic feet required by other cities using open flame gas lamps. This difference will put New York about equal to the highest in cost of this kind of lighting.

Apparently, except where competition is obtained, as in Baltimore, Washington and Chicago, the rates for mantle gas and naphtha lamps remain at from $29 to $30. New York is charged at this rate, and, consequently, ranks with the cities charged the highest price.

In open flame naphtha lamps the price appears to range from $15.95 to $22.81. New York pays $22.

In the price of 2,000 candle power lamps on underground service, or on overhead service, the bids New York has received are above the average, particularly when it is considered that out of its 4,196 2,000 candle power lamps, only 2,852 are on the underground service, and that figure is attained by counting the underground twin arc lamps on Fifth and Madison avenues, as two, whereas the underground installation required is the equivalent of one 2,000 candle-power lamp. There are no underground lamps in The Bronx, yet New York is charged $146 for 1,944 2,000 candle-power lamps in this borough.

The cost of conduit per duct mile in The City of New York could not be obtained. The only information which we could use apparently was the fact that to a customer desiring to use same the charge per duct mile made by the Consolidated Telegraph and Electrical Subway Company is $900.

Even if we assume an installation cost of $5,000 per duct mile, which is undoubtedly high, this rental charge is still large and out of all proportion to similar charges of other cities.

As will be noted from the above table, Boston and Chicago more closely approximate the conditions of New York as to number of lights of all kinds and for arc lights underground. Chicago is figured here on the cost of lamps which it rents from the Chicago Edison Company. Its average price per light if it took all its light from the Chicago Edison Company would be $116.79 per annum. Chicago has a municipal plant which it operates successfully and with satisfaction to itself. Boston has a contract with the lighting companies on a sliding scale, depending upon the number of lights burned. The various conditions of this contract, if enforced, gives Boston most of the advantages of a municipal plant without the expense of construction of same.

Two other cities, Baltimore and New Orleans, should be noted here. Baltimore made a careful investigation as to the installation of a municipal plant for electric lighting, and obtained the authority from the Legislature, allowing it to build such a plant, if it so desired. As soon as this was passed the companies reduced the price of electric arc lights from $127.75 to $99.92 per year. New Orleans followed Baltimore's example, and also made a careful investigation of the question of municipal ownership. Having determined what it would cost to light the city from a plant operated by municipal authority, it advertised for bids to compete with this. The bids it received are being considered now. The city had formerly paid the price of $127.75 per arc lamp under a ten-year contract. On a temporary two-year contract it paid $100, and the bid of the companies supplying electric light to meet the municipal figures of New Orleans is $75 for an overhead lamp, and $90 for a lamp furnished underground, for the number which the city desired to put in.

Condition of Lighting.

The general lighting of the City is poor and unsystematic. The old-fashioned open flame gas lamps now in use, of the same type and general specifications as supplied 50 years ago, are obsolete and inefficient. More progressive cities are adopting for street lighting electric arc lamps and mantle burners for gas and naphtha. The reason for this is plain. The open flame gas lamps, with repairs added to bids, on the average, in Manhattan and The Bronx, cost about $17.45. They give a nominal candle power of about twelve. The mantle burner can be obtained and maintained throughout the year for a price between $20 and $25. This burner consumes a little less gas and gives 60 candle power. In other words, by paying from 40 per cent. to 50 per cent. more for the mantle burners, one obtains five times the light given by an open flame burner, and this is true of both open flame gas and open flame naphtha lamps.

The boroughs of Manhattan and The Bronx are using now 19,549 open flame gas lamps and 1,439 open flame naphtha lamps, for which we are charged the sum of $383,619.88 per year. The lamps in Manhattan could all be changed to mantle lamps at an increased charge of $146,766.12 at the present bid price, but a great gain in illumination.

This does not take into account any saving caused by the increased number of arc lamps referred to elsewhere in this report, or any reduced cost or reduced number of present lamps.

The main avenues in the City, particularly on the central ridge of the island, are quite well lighted, but the east and west sides are very badly lighted, increasing in this regard as you approach either shore of the island. It is in these sections that a dense and poorer population lives. This population, in fact, lives on the street, particularly in the warmer months. It has no other place to go, and yet the streets are not nearly as well lighted as other sections of the City. It is in sections like this where the remark can justly be made "that an arc lamp is equal to a Policeman." So far as possible in the limited time an endeavor has been made to improve the lighting of the worst sections, but little could be done until a general system is planned and put in force covering the entire City.

In The Bronx the same criticisms are true, even more so. This section is growing very rapidly, and through defects in franchises and other causes the lighting has not kept pace with the increased population. The gas pressure is so low at times as to be dangerous. Many people are suffering because they cannot get gas in their houses, and altogether the condition of The Bronx is such that it will shortly have to be taken up in a wholesale manner, and a comprehensive plan of lighting and distribution made, which will provide for the extensions called for by the constant increase of population.

About a year ago this Department assumed the duty of paying the bills for the lighting of all the other departments, except the Department of Docks and the Board of Education, with a few minor exceptions.

It was found in general that the lighting in public buildings was not very good, in many cases very extravagant. Most of the appliances used for burning gas were obsolete, had not been properly taken care of, and consequently were consuming far more gas than was necessary; the gas pressure was not properly regulated by governors in the buildings and no inspections were made.

There is no doubt that if these buildings were properly equipped, inspected regularly and checked by comparisons made with previous months and previous years, that the consumption of gas could be reduced at least 25 per cent. The electric lighting in public buildings was much better so far as lighting was concerned, but in many cases is extravagant and could be considerably reduced. A number of 32 candle power lamps are used where there is no necessity for same, and in many cases far more lamps are installed than should have been put in originally.

Improvement of Present Street Lighting.

In order to improve the present street lighting of the City it would be necessary on some of the avenues, particularly on the east and west side, where the population is very dense, to place arc lamps at the intersections of the streets, abandon all open flame naphtha and gas lamps and install mantle lamps between the arc lamps at the street intersections, keeping, so far as possible, to the present location of the lamp-post, so that new service mains need not be laid. The gas lamp-posts adjacent to the proposed arc lamps referred to should be discontinued and removed. If the City obtained more reasonable prices for electric lamps and mantle lamps than it is at present charged, the additional expense would not be large, whereas the amount of light given would be very materially increased. It was estimated at one time during the past year that about 1,500 more arc lamps were required than are at present installed in the two boroughs. If the prices of electric lamps were reduced from 20 per cent. to 25 per cent., and all the open flame and incandescent electric lamps were replaced by mantle lamps at $25 per lamp per annum, no additional cost would ensue to the City at all. To attain the saving noted the number of gas lamps would be decreased on account of putting in higher candle power lamps, all of which would act to decrease the general cost of lighting to the City.

During the past year, under quite difficult conditions, permits have been issued for changing about six hundred and fifty open flame lamps to mantle lamps, erecting about four hundred and forty new mantle lamps and about three hundred new arc lamps. These figures include a certain lot of five hundred (500) mantle lamps put in, in various places throughout the City, by the Consolidated Gas Company for trial until the first of January, 1904. During the test these lamps were to be charged for only as open flame lamps. These lamps have proved satisfactory, and if a reasonable price for same is made, should be retained.

There are several lighting companies throughout the country, of good standing, who would be prepared to enter into competition and bid for mantle lights, provided they could obtain gas in The City of New York from the gas companies now operating in the City. These companies are quite prepared to fill the specifications required, both for candle power and maintenance. Arrangements of this character are now in force in Chicago, Baltimore and Washington, and appear to be working smoothly and satisfactorily.

If it could be done legally, it would be well if different sections of the City could be separately advertised for bids, so that in this way more than one company might be brought in, and natural competition in service be obtained.

Improvement in Public Building Lighting.

In investigating this matter it was found that very little data had ever been obtained in regard to the number or kind of lights in use. No comparisons were made with previous years as to increase and decrease of consumption and the causes of same; in fact, little attention had been paid to the matter as a whole. As the charge for the lighting of these buildings, including the Board of Education, amounts to about $357,500 per annum, the importance of the matter is apparent.

The principal causes for the waste of gas and electric light in public buildings are the obsolete and inefficient appliances, lack of instruction, lack of proper inspection and control, and the fact that the additional installation of lights in the buildings is not made with any reference to what is required from a proper lighting standpoint, but is made entirely according to the whims of the architects and occupants of the premises, which in many cases are ill-advised and extravagant. Many instances of waste can be found throughout the different departments, which are made mainly through ignorance and neglect. Many instances of gas burners consuming ten to twelve cubic feet of gas per hour are found where there is no necessity for more than five or six cubic feet. Old-fashioned methods of gas lighting are in use which merely consist in adding more and more open flame burners, With the present systems of gas arc lamps and mantle lamps a very large part of this waste could be prevented.

In electric lighting we find 32 candle-power lamps in use, in many instances, where only 16 candle-power lamps are required. In one instance a 32 candle-power lamp was found lighting a closet 4 by 4 feet in area. In many instances the electric current is left on in the buildings in the day time, and it has been found by this Department, as well as by the Commissioners of Accounts, that electric lights are turned on during the day without the slightest necessity. In addition to this, nearly all the lamps in use, both gas and electric, are enclosed by globes which seem to have been designed to cut off the greatest amount of light possible. In many cases placing the proper kind of globes on these lamps has increased the light so that complaints of insufficient light have been stopped entirely.

The remedy for all this is so simple that it seems remarkable that it has not been enforced. For instance, for gas lighting, proper governors should be placed on the buildings, and after they are installed should be maintained and inspected and not left alone to become useless in a few months. Economical gas tips, of which there are numbers in the market, should replace the extravagant 10 and 12 foot tips that we find in so many places. Mantle gas lamps consume usually only three cubic feet of gas per hour, and should replace, in many instances, the open-flame lamps in use. They also must be maintained and inspected in order to be kept in an efficient condition. They cannot be left alone, for if they are, in a very few months they become worse than the open-flame burner. Electric current should be shut off in a great many buildings now permitted to use it in the day time. Thirty-two candle-power lamps should only be allowed under special circumstances, and the supply, testing and efficiency of electric lamps should be carefully governed by the Bureau in Charge of Lighting. At present no such inspection is made.

To show what a few instances of this means, several buildings were equipped with economical appliances as test buildings. The results shown in gas lighting by merely changing the tips and adjusting governors are as follows:

At a fire engine house the daily average consumption from October 29 to November 6, 1903, was 837 cubic feet per day for eight days. On November 6 the building was entirely equipped with economical gas tips. The consumption was reduced to 400 cubic feet per day for a period, from November 6 to November 27, of twenty-one days.

The total approximate consumption for the month of November, on the basis of 837 cubic feet per day, was	25,110 cubic feet
The total approximate consumption for the month of November, on the basis of 400 cubic feet per day, was	12,000 cubic feet
Decreased consumption	13,110 cubic feet

At a police precinct station house the daily average consumption from October 29 to November 11, thirteen days, with the old burners, was 1,131 cubic feet per day. The daily average consumption from November 11 to November 27, under the new burners, was 962 cubic feet per day, for sixteen days.

The total approximate consumption for the month of November, 1903, on the basis of 1,131 cubic feet per day, was	33,930 cubic feet
The total approximate consumption for the month of November, 1903, on the basis of 962 cubic feet per day, is	28,860 cubic feet
Decreased consumption	5,070 cubic feet

At a District Municipal Court the daily average consumption from October 29 to November 18, on old sytem, 2,163 cubic feet per day for twenty days. Daily average consumption from November 18 to November 28, with new burners, 1,881 cubic feet.

Total approximate consumption for the month of November, on the basis of 2,163 cubic feet per day	64,890 cubic feet
On the basis of 1,881 cubic feet	56,430 cubic feet
Decreased consumption	8,460 cubic feet

In one of the larger markets for the month ending September 11 the amount of gas consumed for four weeks ending August 13, 1903, was	161,700 cubic feet
The consumption for four weeks ending September 11, 1903, was	110,500 cubic feet
Decreased consumption	51,200 cubic feet

Total decreased consumption for four buildings, 77.840 cubic feet.

The above saving is made in each of these instances by doing only two things—properly regulating the pressure by the governor and watching it and by installing new and economical gas tips. The expense for such changes was very small. When you consider that these four instances have a total number of gas burners of 669, and that in public buildings The City of New York has a total of about 90,000 burners, the possible saving becomes enormous, particularly when it is considered that this occurs by putting buildings in good repair in the simplest manner possible and then watching them.

We have equipped two armories experimentally with gas arc lamps. In these two armories, in a period of two months at one and a period of seven weeks at the other, we saved a total of 445.100 cubic feet of gas. These armories used formerly for lighting coronas of open flame gas jets. The gas lamps installed by us give a light very much like an electric arc light on a very small consumption of gas. In the year ending October 1, 1903, these two buildings consumed altogether 6,211,400 cubic feet of gas. Under the present gas arc lamps installed the saving in eight months of heavy burning would be a little over 1,900,000 cubic feet, nearly 33 1-3 per cent. This test shows easily what can be done with this method of lighting and the inefficiency and extravagance of the old method. Complete data of this test is given in the exhibits attached.

By cutting off the current in the day time of the armories lighted by electric lights we have saved between $200 and $300 per month. We have also caused a number of 32 candle power lamps to be discontinued, but cannot get any particular data from this as yet on account of the natural increase of longer burning hours, due to the season of the year.

A certain number of public buildings have private electric plants. While these are desirable in many cases on account of the high prices for electric current charged, at the same time the lighting is under the control of the department operating it. To a certain extent the conduct of these plants should be under this Department. Two incidents have occurred lately in this regard which are worthy of mention. At a certain building some time in October they stopped the use of their private plant, and in so doing were able to lay off a certain number of Engineers and Firemen and thereby make a considerable economy for their own Department. This was done without any notice to this Department. In consequence their consumption of kilowatts hours during the months of October and November and December from the lighting companies immediately increased and the charge for these three months was increased $719.39. In other words, while they apparently decreased their building's expenses, they have done so at the expense of this Department to the amount of $719.39. Another incident of similar character occurred in a building of another department, where one of the Engineers was suspended by the Commissioner to await trial on charges. Instead of immediately putting in a temporary Engineer they shut down the plant during the eight hours shift which had formerly been taken by the old Engineer. This involved a charge to this Department of $346.56 for the month of November. Incidents of this character, as readily will be seen, have largely increased the expenses of this Department and prevented the City from earning any interest from the money which it has invested in its plant.

One of the main reasons for the large expense for electric lighting is the high price charged per k. w. hour by the different companies. As billed to date the City is charged by the United Electric Light and Power Company an average of 8 cents per k. w. hour for all the service consumed. The New York Edison Company in Manhattan charges at the rate of 9.96 cents per k. w. hour for the average of all its lighting. The New York Edison, in The Bronx, charges 11.4 cents on the average for all the lighting it furnishes. A comparison of this with other cities, as shown on a previous page, shows that New York, in spite of its enormous consumption, is not by any means paying as low an average rate as a number of cities throughout the country, consuming much less light, notably Milwaukee, St. Louis, Baltimore, Washington, Philadelphia and Providence. In former years a department was allowed to obtain a discount on its rate, based on entire consumption of all its buildings for any one month or year. This is no longer allowed. We are credibly informed that a number of private consumers throughout the City are allowed much better rates than The City of New York. One company in particular, which has stores scattered throughout the City, we understand, is allowed to get a discount based on the sum of the consumption of all the stores in any one month.

To show what the Edison Company can do if it chooses, reference is made to the recent estimates of cost supplied by them to Professor Sever, Consulting Engineer of this Department, for the lighting of Police Headquarters. While they rather overestimated the number of hours in consumption of current, their estimate for lighting current was based on 5 cents per k. w. hour, and for power for motors 4½ cents per k. w. hour. This low rate can be accounted for when it is stated that the question to be decided was whether the Police Department should install an electric lighting plant or take current from the New York Edison Company. In this case the result of competition by the City with a plant of its own is obvious. With the City of New York each building is taken by itself and charged for without any reference to the fact that it is part of a department, and of a City which uses great quantities of lights. In other words, The City of New York consumes light on a wholesale basis and is charged for it on a retail basis.

On the next page are given the appropriations and estimated expense for gas and electric lighting for public buildings in Manhattan and The Bronx by quarters for the year 1903, marked Exhibit "D."

It will be noted that all the departments, except Charities, Health, Street Cleaning and the Public Buildings, run over the amounts appropriated for them. In the case of the Street Cleaning Department and Public Buildings, the actual burning in December will probably show that these two items will change

to a small deficiency. The proposed appropriation for the Board of Education, which was never transferred to this Department, as will be seen, is entirely inadequate. The Fire Department, Police Department and Department of Correction and the Armories all show rather large deficiencies. In the case of Fire, Police and Charities, this is largely on account of the additional buildings connected during the past year. It hardly seems proper for this Bureau to pay the several deficiencies out of its own appropriation, when it has no real control over new installations, new appliances, or wasteful use.

The above does not refer to the deficiency of the Board of Education, as the lighting of the schools was never assumed by this Department.

In addition to the above it should be stated that buildings are in course of erection which will require 15,000 more lights than are now in use.

EXHIBIT "D."

Expenditures for the Lighting of "Public Buildings and Offices" of Each Quarter for the Year 1903.

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Year.	Appropriation.	Saving.	Excess.	Per Cent. Saving.	Per Cent. Excess.
Board of Education	$54,020 70	$23,692 97	$10,189 35	$50,365 42	$138,268 44	$85,980 00	.....	$52,288 44	....	.608
Fire Department	6,696 99	5,288 16	4,704 40	6,952 23	23,641 78	21,500 00	.....	2,141 78	....	.10
Police Department	9,306 93	7,291 05	5,955 44	8,776 51	31,329 93	28,600 00	.....	2,729 93	....	.095
Charities Department	6,135 85	4,746 45	4,382 34	7,088 81	22,353 45	22,800 00	$446 55	.....	.02	....
Corrections Department	7,587 01	4,330 55	2,438 84	3,833 65	18,190 05	15,800 00	.....	2,390 05	....	.151
Health Department	2,423 24	1,936 95	1,777 01	2,594 22	8,731 42	10,500 00	1,768 58	.....	.168	....
Park Department	1,177 26	957 29	1,045 62	1,374 85	4,555 02	4,200 00	.....	355 02	....	.085
Bellevue and Allied Hospital	6,262 51	4,721 76	4,319 01	6,926 02	22,229 30	21,000 00	.....	1,229 30	....	.059
Street Cleaning Department	3,206 45	2,192 28	1,591 10	2,665 01	9,654 84	9,900 00	245 16	.....	.025	....
Borough President, Manhattan	642 60	623 90	726 59	722 93	2,716 02	2,500 00	.....	216 02	....	.086
City College, City of New York	386 97	244 41	163 76	570 89	1,366 03	1,000 00	.....	366 03	....	.366
Public Buildings, including Law Department	8,626 95	7,594 24	7,291 26	9,638 23	33,150 68	32,503 00	.....	647 68	....	.02
Armories	13,291 76	8,391 99	3,419 18	11,105 49	36,208 42	34,552 00	.....	1,656 42	....	.048
Markets	1,661 04	1,304 37	761 31	829 89	4,556 61	3,745 00	.....	811 61	....	.217
* Bridges	.....	.....	.....	2 62	2 62	.....	.....	.....	....	....
Total	$121,426 26	$73,316 37	$48,765 21	$113,444 15	$356,951 99	$294,580 00	$2,460 29	$64,832 28	....	.22
Saving								2,460 29	.008	....
Net excess								$62,371 99	....	.212
Board of Education								52,288 44	....	....
Net excess without Board of Education								$10,083 55	....	.048

* Bridges not in totals.

Limitations of the Bureau of Lamps and Gas.

While this Bureau has been placed in charge of paying the bills for lighting other departments, it is really powerless to control said lighting, because the necessary authority is not given it. Its position is similar to an Auditor who certifies only the mathematical correctness of a bill without any authority to enforce even ordinary economy. This Bureau can refuse to pay the bill, but the result of such action would ultimately be stoppage of service by the company furnishing the light. The result of shutting off the light in certain departments would be disastrous, notably in the Board of Education, Fire Department, Police Department, and in Hospitals, Armories and Prisons. This Department has no direct control of the original installation of lights in new buildings, although in many instances it has obtained same by refusing to issue permits to the lighting companies to connect up the premises in question until plans had been submitted to and approved by it. The responsibility for maintenance and supply of repairs to lamps in many public buildings is in charge of the Department of Public Buildings and Offices, so that the Department of Water Supply, Gas and Electricity has no power to recommend, put in place or approve the appliances used for burning gas or electricity. It has no appropriation with which to make ordinary tests of the various appliances used in public buildings or in the street lamps, nor are any samples of the apparatus to be used in these lamps required to be submitted to it for approval. Under such conditions it can readily be seen that this Bureau is not equipped to efficiently perform the duty imposed upon it.

Appropriation and Expense of Lighting the Boroughs of Manhattan and The Bronx.

The present total appropriation and expense for street lighting, public building lighting, operation of the Bureau, supplies and inspections, are given below. These figures are derived from the bids made and the unadjusted bills rendered for the year 1903 to December 31.

Detail of Lighting Appropriation—1903.

Board of Estimate and Apportionment allowed, 1903		$1,583,163 50
Including for lighting buildings	$295,430 00	
Less Board of Education	85,980 00	
		209,450 00
Leaving for street lighting		$1,373,713 50
Expenditure, as per bills for street lighting rendered in Comptroller's hands for settlement	$1,242,356 34	
Repairs to equipment	18,923 05	
Erection of new lamps	1,612 00	
Expense of Bureau—		
Salaries—Inspectors paid from Lamps and Lighting	12,229 37	
Expense—Repairs to other departments	3,515 74	
Routine expense	5,248 50	
Contract supplies for street lamps, largely on hand and vouchered	11,719 78	
Contract supplies not yet received	6,108 72	
Orders not yet billed and vouchered	1,950 00	
		1,303,663 50
Surplus street lighting, appropriation Lamps and Lighting		$70,050 00
Appropriated for public buildings lighting, not including Board of Education	$209,450 00	
Less Normal College appropriation, not included in Public Building figures	850 00	
		$208,600 00
Amount billed for public building lighting, without Board of Education		219,149 51
Deficit public building lighting, over amount appropriated in Lamps and Lighting		$10,549 51
Surplus street lighting, Lamps and Lighting		$70,050 00
Deficit public building lighting, Lamps and Lighting		10,549 51
Net surplus, Lamps and Lighting		$59,500 49
Salaries—Lighting and Electricity, for Bureau Lamps and Gas	$22,243 50	
Paid for Inspectors and other salaries from this appropriation	12,369 60	
Net surplus		9,873 90
Net total surplus		$69,374 39

Organization and Results in the Bureau of Lamps and Gas in the Year 1903.

At the beginning of the year only six (6) Inspectors were employed by the Bureau and assigned to the inspection of lighting in the Borough of Manhattan, and two Inspectors in the Borough of The Bronx. It was physically impossible for these men, no matter how efficient they might have been, to have covered the inspection of lighting and repairs to street lights as it should have been done, so it was requested that fourteen (14) additional Inspectors be appointed. The Borough of Manhattan was divided up into nine inspection districts, and the Borough of The Bronx into five inspection districts; the Inspectors were required to inspect these districts at comparatively short intervals. The Inspectors, however, worked only through the daytime, three Inspectors being assigned to night duty to look after outages. This arrangement, while it improved the situation, did not produce the results which were expected.

Mr. Adriance, who was in charge of the Inspectors, having received an advantageous offer from another city, resigned and left the Department the 1st of July. His work was distributed and a new system was slowly built up, which up to date has worked very satisfactorily. It was found that more night inspections were necessary, as well as a quicker method of checking up repairs and changes of meters. Mr. Adriance's work was divided among three of the older Inspectors, who were promoted and given the title of General Inspectors. Mr. Primo Porcella was placed in charge of the office and the Inspectors when in the office. Mr. William G. Quirk was placed in charge of the outside work, draughting room and Inspectors when on street work. Mr. Frederick J. McGuire was placed in charge of public building lighting and two Inspectors were assigned to him. The clerical work the old Inspectors used to do in making out reports was changed and is now performed by men in the office, so that the Inspectors could be most of the time on the streets, inspecting. Two Inspectors were assigned to checking up repairs of gas lamps, such as service and standpipes, and other items which were important and required personal inspection. One Inspector was retained at the office to attend to sudden calls in relation to changes of meters and other matters which needed immediate consideration. The hours of the Inspectors on the streets were changed from day work, only, to five hours' work in the afternoon and three hours' work in the evening. The result of this began to show immediately in the reports of outages, in the number of repairs to be made by the Gas Company without expense to the City, as had been prescribed by contracts prior to 1903, and in general in a much more efficient performance of duty.

Mr. Porcella has so systematized the method of reporting by the Inspectors that they are now in the office less than an hour a day, and all the comparisons, daily instructions, orders and so on are made up by him instead of being made by the Inspectors themselves.

Mr. Quirk has subdivided each inspection district into sections, and requires an inspection of about one section per day. He has further arranged the inspections of repairs, meter readings, and so on, in such a manner as to save time and so increase the number of inspections per day.

Mr. McGuire, with the two Inspectors under him, took charge of the lighting of public buildings. So little was known of this that it was necessary first to count the buildings and then count the lights, which required a great deal of detail work covering six months.

For reasons pointed out comparatively little saving could be made in the expenditure for public buildings, but such information is now on file that a detailed report of the consumption can be given for any public building in Manhattan and The Bronx.

The Inspectors are now so trained in their duties, and the three General Inspectors, Messrs. Porcella, Quirk and McGuire, have systematized and taken charge of the matter so well that no additional supervision is required than at present.

The number of outages reported by the Inspectors and Police and rebated to the City by the gas companies for this year, amounted to 49,522 for the regular street lamps of all kinds. On street sign lamps the outages reported were 1,386. By far the larger part of these outages reported have occurred during the last half of the year, during which all the Inspectors put in three hours per night looking for lamps out.

The total number of repairs of lamps and lampposts as required under previous contracts to keep the lights in good condition, have amounted to 5,406 for this year. In addition, in the last six months, many small repairs were called for and performed free of charge by the gas and electric companies. These had not been checked before, although they take a good deal of time and care and have a marked effect on the satisfactory operation of the lamps.

The progress made in the last six months warrants an earnest recommendation that the system now in force be extended and further improved, and that power be given the Department to control the use of lights, the use of the appliances which make the light, and to enforce proper regulations of economy in other Departments.

All plans of new buildings should be submitted to it for approval as to the lighting installed. Under the present rates as charged by the lighting companies, it is most important in electric lighting that very few lights should be put in which

are used only on rare occasions. The rules of the lighting companies require that in order to get a low rate, a Department must use all of its lights two hours every day for eight months in the year. This is impossible if a large excess capacity is installed which is rarely used. Out of 600 buildings only three now earn this rate outside of the Board of Education.

This Bureau has charge of the supply of repair parts for lanterns and lamp-posts owned by the City. The lighting of the two boroughs has gotten so large that the supply of repairs which have to be carried in stock has completely outgrown the store-room, and the Bureau should be furnished a certain amount of ground and a building where we can store such articles as fire alarm and other lanterns, boulevard and police globes, lamp-posts and repair parts. These are now issued to the gas companies in much larger quantities than are required, simply because we have no room to store them anywhere. Facilities for inspecting repair items as received are very poor, and entail much unnecessary work. A storekeeper should be put in charge and an exact stock ledger be kept showing the distribution of these supplies among the various companies as fast as they are needed for actual use. This building also should be large enough to accommodate a small experimental laboratory for ordinary tests, and all companies furnishing light to the City should be obliged to furnish samples of the appliances which they use for lighting.

Reorganization of Bureau.

During the last year it has been shown to a limited extent what could be accomplished by a thoroughly efficient Bureau of Lamps and Gas if equipped with the necessary authority and power. So far only the boroughs of Manhattan and The Bronx have been investigated.

The Bureau should be reorganized to embrace the lighting of Greater New York, with a Chief Engineer in charge and assistants in each Bureau acting under him on the lines suggested in the boroughs of Manhattan and The Bronx. This Engineer should be responsible to the Commissioner of the Department for all matters concerning lighting, inspections of light, repairs, supplies and appliances for same. A reasonable system of promotion from Inspectorships would speedily develop a set of men coming from and trained in the Bureau itself, who could be used very efficiently under competent direction, without necessarily involving the expense of a number of Assistant Engineers.

This has been shown in the increased efficiency of the Borough of Manhattan, where all the employees except the Engineer-in-Charge, have risen from the position of Inspectors, Junior Clerks or Draughtsman.

In connection with this report the formal statistics of the fourth quarter and a summary of the general statistics for this year, are given.

A list of the street signs paid for this year from the fund in charge of the Borough President of the Borough of Manhattan is also given, as well as the list of employees of the Bureau.

These are attached and marked Exhibit "E."

All of which is respectfully submitted.

C. F. LACOMBE, Engineer of Surface Construction.

EXHIBIT "A."

Report to the Commissioner of the Department of Water Supply, Gas and Electricity on the cost of building and operating an electric plant for the public lighting of the boroughs of Manhattan and The Bronx, by Cary T. Hutchinson, Consulting Engineer No. 56 Pine street, New York City.

Office of Cary T. Hutchinson, Consulting Engineer,
No. 56 Pine Street,
New York City, May 11, 1903.

Hon. ROBERT GRIER MONROE, Commissioner, Department of Water Supply, Gas and Electricity, Park Row Building, New York City:

Sir—I hand you herewith my report on the cost of construction and operation of an electric plant for the public lighting of the Boroughs of Manhattan and The Bronx, of The City of New York.

There are now in service 5,000 arc lamps in the Boroughs of Manhattan and The Bronx and a total equivalent connected capacity of 160,000 sixteen-candle power incandescent lamps. There should be at least 10,000 arc lamps in these two boroughs, and all the lighting of the public buildings should be done by electricity. I have therefore made my principal estimates on a plant to supply 10,000 arc lamps and to do all the lighting of public buildings by electricity, but have added a supplementary estimate for a plant to meet the present conditions only.

The cost per year for one arc light, including interest at 3.5 per cent., and depreciation at 8 per cent., will be $69.40, and for 10,000, $694,000.

The cost per kilowatt-hour for incandescent lighting will be 5.475 cents, and the annual cost for all this lighting will be $219,000, making a total of $913,000 for the two services.

For 5,000 arc lamps and the lighting of public buildings, the cost per year per arc light will be $80.80, and the total cost will be $623,000; at the present rates charged the City the annual cost is $1,130,000, an annual saving of $507,000.

The total cost of construction of a plant for 10,000 arc lights and the public building lighting, excluding the cost of subway ducts (which, you have informed me, the City has the right to use free of rental), will be $4,208,000; the annual saving of $947,000 with this plant amounts to 22.5 per cent. of its cost.

The total cost of construction of a plant for 5,000 arc lights and the public building lighting, excluding the cost of subway ducts, will be $3,000,000; the annual saving of $507,000 with this plant amounts to 16.9 per cent. of its cost.

Ten thousand arcs and the present public building lighting can be supplied for $200,000 less than the City is now charged for 5,000 arcs and the public building lighting.

This lighting can be done at practically half the rates now charged to the City.

These estimates are all based upon economical construction and operation of the plant.

Very respectfully yours,
CARY T. HUTCHINSON.

Report on Electric Plant for the Lighting of the Boroughs of Manhattan and Bronx.

This report gives the cost of construction and operation of a plant to supply 10,000 480-watt arc lamps and about 150,000 incandescent lamps, in Manhattan and Bronx.

General Conditions.

There are now in Manhattan 3,155 arc lamps and in The Bronx 1,822—a total for the two boroughs of 4,977. This number is insufficient—particularly for Manhattan. There should be at least twice as many in Manhattan; 10,000 is the minimum now required, and more would be better.

The City now pays for lighting about 600 public buildings and places, such as markets, parks, school houses, police stations, engine houses, hospitals, repair shops and yards, public baths, etc.; about half of this lighting is by gas, the rest by electricity. All of this lighting should be electric; the equivalent connected capacity of all this public lighting is about 160,000 sixteen-candle power electric lights; in the near future large extensions of this lighting will be required. There is no satisfactory way to estimate the future requirements; hence central station capacity has been provided only sufficient for all the present lighting of public buildings and places by electricity, eliminating gas entirely. The central station capacity can easily be increased as the demand increases.

The conditions in Manhattan and in The Bronx are very different. In Manhattan all circuits must be underground and the distribution of lighting is relatively dense. In The Bronx the problem is more that of a suburban town; all wires are overhead and the density of the distribution is low.

In order to get a close approximation to the distributing system required, every arc light now in use in the two boroughs was plotted on a map of large scale; substations were placed at suitable points and the length of the circuits measured; similarly for the incandescent lighting, each building or public place now lighted by the City was plotted on the map, with the number of lights connected; a distributing system was then laid out to provide for the lights. This information was obtained by actual counting of all lights in some 600 places.

System.

For street lighting I recommend the use of 7.5 ampere, inclosed, series, alternating current arc lamps; for lighting public buildings and places, an alternating current system.

The central station capacity to supply 10,000 480-watt arc lamps and 160,000 sixteen-candle power incandescent lamps will be 10,000 kilowatts.

The system will comprise a power station located at some convenient point, with generators supplying current to a transmission system consisting of high-pressure feeders placed underground and terminating in substations, from which will radiate the distributing circuits for the arc and incandescent lights.

The length of the high-pressure feeders has been measured from the eastern side of Blackwell's Island. The precise location of this station is largely immaterial, the chief points of importance being good facilities for coal and water. The feeder lengths will be less than estimated for any other probable site. Blackwell's Island has the additional advantage of permitting easy access to Brooklyn.

In Manhattan there will be five substations principally for the arc lighting circuits, but providing also for that part of the incandescent lights within reasonable distance. These substations will all be connected to the central station by duplicate 10,000 volt feeders, placed underground in ducts. The incandescent lighting is so scattered that it cannot be economically provided for from these substations; branch feeders at 10,000 volts will run from the substations and terminate in transformers placed in certain of the buildings now lighted by the City. The buildings so selected will then become centres of distribution, and from them will radiate the low pressure lighting circuits. The high pressure branch feeders will terminate in brick inclosures in which oil-insulated transformers will be placed.

For The Bronx a somewhat different system must be used, on account of the greater distance apart of the buildings to be lighted and the great cost of an underground system; a substation will be placed near the Harlem river, where the pressure will be changed to 3,500 volts, and from this substation 3,500-volt, three-phase feeders will run overhead to centres of distribution placed either in public buildings, as on Manhattan, or on tops of poles; the 3,500-volt feeders will also supply the constant current transformers at the three substations from which the arc lighting circuits radiate.

This system, with one type of generator and transmission circuit for both kinds of lighting, is the simplest that can be used; it will be easy to adapt it to any improved methods of lighting; in particular, it permits the use of Nernst lamps in the public buildings.

Central Station.

The central station will be equipped with three-phase, 60-cycle generators, having a combined capacity of 10,000 kilowatts, at a power factor of 80 per cent.—6,000 kilowatts for arc and 4,000 for incandescent lighting.

The estimates of the cost of this station are made for machinery of the best character, including water tube boilers of an aggregate capacity of 10,000 boiler horse power, equipped with coal and ash handling machinery, stokers, economizers, superheaters and all accessories; and vertical, cross-compound, condensing engines of the Corliss type, each direct-connected to 60-cycle, three-phase, 80-revolution, 10,000-volt generators. There will also be direct-driven exciters, the usual switchboards and auxiliaries. The total rated capacity of the generators will be 10,000 kilowatts, but their overload capacity is ample to supply this power with one unit out of service, and there will be ample reserve in the boiler plant to operate with one battery out of service.

The estimate includes engines of the Corliss type. The use of steam turbines would reduce the cost of construction by some $200,000, and should be seriously considered before the plan is finally decided upon.

Real Estate.

In the estimate of the cost of the central station no charge is made for real estate. The best site for this station is on the eastern side of Blackwell's Island, where the property is owned by the City and is not in use; but if this site cannot be secured, the City owns a block front on the East river, well located for this purpose, which is valued at $45,000 and now is rented at $40 per month.

Central Station.

Table I. gives the cost of this station.

TABLE I.

Cost of Central Station.

Boiler plant complete, having a capacity of 10,000 boiler horse power, with coal and ash handling machinery, economizers, superheaters, piping and foundations, ready for operation	$500,000 00
Vertical engine plant erected complete, with condensers, foundations, and piping	325,000 00
Electric generating plant, having a capacity of 10,000 kilowatts, erected complete, including generators, exciters, switchboards and all auxiliaries	300,000 00
Excavation and building	250,000 00
Total	$1,375,000 00

This is equal to $137.50 per kilowatt; it is higher than the cost of either the Manhattan or Rapid Transit stations.

Sub-Stations.

In Manhattan there will be five sub-stations, supplied at 10,000 volts, and providing for all arc and some incandescent lighting. There will also be about fifty centres of distribution for incandescent lighting alone.

The arc lighting has been laid out in circuits of approximately fifty lights, with a maximum voltage of 4,500.

In The Bronx there will be a principal sub-station where all energy will be transformed to 3,500 volts, three sub-stations for arc lighting, and about twenty centres of distribution for the incandescent circuits; the incandescent lights in all cases will be supplied from a 240-volt, three-wire, alternating current system.

The lighting in The Bronx is only about twenty per cent. of the total for the two boroughs; hence the double transformation is a matter of minor importance. In the future, when the number of lights in The Bronx becomes greater, it will be a simple matter to change over to a 10,000-volt underground system. The number of motors in service is so small that it is not worth taking into account in this general estimate.

Cost of Plant.

The total cost of the plant for supplying 7,000 arc lights in Manhattan, 3,000 in The Bronx, 125,000 incandescent light connections in Manhattan and 25,000 in The Bronx, is given below in Table II.:

TABLE II.

Cost of Plant.

1.	Power plant, as above	$1,375,000 00
2.	High-pressure feeders	260,000 00
3.	3,500-volt feeders, in The Bronx	40,000 00
4.	Distributing circuits for incandescent lighting	90,000 00
5.	12,000 light capacity constant current transformers	120,000 00
6.	7,500 kw. capacity constant potential transformers	75,000 00
7.	Switchboards in sub-station	75,000 00
8.	Arc light cable, Manhattan	540,000 00
9.	Arc light circuits, Bronx	50,000 00
10.	Centres of distribution, structures only	50.000 00
11.	Arc light poles, Manhattan and Bronx	345,000 00
12.	Arc lamps and fixtures	250,000 00
13.	Distribution poles for Bronx	150,000 00
14.	Five buildings in Manhattan for sub-stations	100,000 00

15.	Four buildings in Bronx for sub-stations	50,000 00
16.	Real estate in Manhattan	95,000 00
17.	Real estate in Bronx	20,000 00
18.	Engineering and contingencies	370,000 00
19.	Interest during construction	143,000 00
	Total	$4,208,000 00

The items of the above table are determined as follows:

Item 1—Is given in detail in Table I.

Item 2—Is calculated from distances measured from the eastern side of Blackwell's Island.

Items 3 and 4—Are determined from measured distances.

Item 5—Is based on estimates submitted by manufacturers.

Item 6—Is determined by fixing the capacity of the separate centres of distribution. Several of these centres will have transformers of medium size, but the majority will be small; the minimum capacity has been kept at about 10 kilowatts.

Item 7—Is an estimate submitted by a manufacturer.

Items 8 and 9—Are determined by measured lengths of all circuits.

Item 10—Is based on the assumption that each centre will be practically a bricked vault.

Item 11—Includes 9,000 poles at $30 apiece, similar to the poles used in Boston, and 1,000 at $75 apiece.

Item 12—Is an estimate submitted by a manufacturer.

Item 13—Is determined by the measured length of circuits.

Item 14—Is an estimate for one-story buildings for sub-stations.

Item 15—Is an estimate for smaller and simpler buildings for The Bronx.

Item 16—Is the value of real estate as appraised by an expert for lots at the points required.

Item 17—Is similarly determined.

Item 18—Is an arbitrary allowance of ten per cent. for engineering and contingencies.

Item 19—Is interest at the rate of 3.5 per cent. for one year, on the assumption that the average period during which the investment will be unproductive will be one year.

Division of Costs.

Table III. below gives the division of the total cost between the arc and incandescent service. This division is made on the basis of 60 per cent. for arc and 40 per cent. for incandescent, of all those items in Table III. that are directly dependent upon the power used. It is assumed that 6,000 kilowatts is used for the arc and 4,000 kilowatts for the incandescent lighting; the maximum power required for the incandescent lighting will probably be less than 4,000 kilowatts, but this amount is allowed. The total energy required for incandescent lighting can, however, be estimated closely. The other items are apportioned on the basis of the actual requirements.

TABLE III.

Division of Costs.

		Arc.	Incandescent.
1.	Power plant, as above	$825,000 00	$550,000 00
2.	High-pressure feeders	120,000 00	140,000 00
3.	3,500 volt feeders in The Bronx	25,000 00	25,000 00
4.	Distributing circuits for incandescent lighting	.....	90,000 00
5.	12,000-light capacity constant current transformers	120,000 00	.....
6.	7,500 kw. capacity constant potential transformers	.....	75,000 00
7.	Switchboards in sub-stations	50,000 00	25,000 00
8.	Arc light cable, Manhattan	540,000 00	.....
9.	Arc light circuits, Bronx	50,000 00	.....
10.	Centres of distribution, structure only	.....	50,000 00
11.	Arc light poles, Manhattan and Bronx	345,000 00	.....
12.	Arc lamps and fixtures	250,000 00	.....
13.	Distribution poles for Bronx	120,000 00	30,000 00
14.	Five buildings in Manhattan for sub-stations	75,000 00	25,000 00
15.	Four buildings in Bronx for sub-stations	35,000 00	15,000 00
16.	Real estate in Manhattan	70,000 00	25,000 00
17.	Real estate in Bronx	15,000 00	5,000 00
18.	Engineering and contingencies	264,000 00	106,000 00
19.	Interest during construction	102,000 00	41,000 00
	Grand total	$3,006,000 00	$1,202,000 00
	Total per arc lamp		$300 60
	Total per kilowatt of station capacity for incandescent lighting		300 50

The total cost of a plant having a capacity to supply 5,000 arc lights and the present lighting of public buildings will be $3,000,000, of which $1,800,000 should be apportioned to the arc lighting service, and $1,200,000 to the incandescent service.

Ducts.

In the above tables of costs, no allowance is made for the cost of ducts; I have been instructed to omit this item of cost, and have been informed by City authorities that the City has the right, under its contract with the Subway Company, to use the subway free of rental.

Cost of Operation.

The operating expenses have been estimated on the assumption that the central station runs three shifts a day, and wages have been taken at current prices in New York.

Coal.

The cost of coal is calculated on the assumption of 3 pounds of coal per kilowatt hour, with coal at $3 per long ton alongside the pier; water is charged at the cost to the City.

Station Load.

The annual output of the station will be 24,000,000 kilowatt-hours for the arc and 5,000,000 kilowatt-hours for the incandescent service—a total of 29,000,000 for both. The present incandescent and gas lighting is equivalent to 160,000 sixteen-candle power connections and uses annually very approximately 4,000,000 kilowatt-hours at the lamps and 5,000,000 kilowatt-hours at the station.

Annual Station Cost.

The total station expense per year will be $217,500, and the cost per kilowatt-hour 0.75 cents; this is somewhat higher than is usually assumed, but agrees well with the records of a number of plants.

Distribution and Management.

The cost of maintenance, inspection and testing of the cable and wiring system, of maintenance and labor at the sub-stations—all of which may be classed as general expenses of distribution—and the expenses of administration, including office, insurance and legal expenses, are given in the following table:

EXHIBIT

TABLE OF PRICES FOR GAS, ELECTRIC

Gas—

Companies.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
New York Gas Light Company	$25 78 2-3	$25 78 2-3	$25 78 2-3	$25 78 2-3	$25 78 2-3	$25 78 2-3	$25 78 2-3	$45 00	$45 00
Manhattan Gas Light Company	25 00	25 00	25 00	25 00	25 00	25 00	25 00	53 00	53 00
Harlem Gas Light Company	28 80	28 80	28 80	28 80	28 80	28 80	28 80	$28 80 50 00	50 00
Metropolitan Gas Light Company	.....	.....	.....	.....	.....	.....	50 00	50 00	50 00
New York Mutual Gas Light Company	.....	.....	.....	.....	.....	.....	.....	.....	.....
Consolidated Gas Company	.....	.....	.....	.....	.....	.....	.....	.....	.....
Equitable Gas Company	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard Gas Company	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Amsterdam Gas Company	.....	.....	.....	.....	.....	.....	.....	.....	.....

Gas—

Companies.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
New York Gas Light Company	$16 66 2-3	$17 50	$17 50	$17 50	.....	.....	.....	.....	.....
Manhattan Gas Light Company	16 66 2-3	17 50	17 50	17 50	.....	.....	.....	.....	.....
Harlem Gas Light Company	18 66 2-3	19 50	19 50	19 50	.....	.....	.....	.....	.....
Metropolitan Gas Light Company	16 66 2-3	17 50	17 50	17 50	.....	.....	.....	.....	.....
New York Mutual Gas Light Company	16 66 2-3	17 50	17 50	17 50	$17 50	$17 50	$17 50	$17 50	$17 50
Consolidated Gas Company	.....	.....	.....	.....	17 50	17 50	17 50	17 50	17 50
Equitable Gas Company	.....	.....	.....	.....	12 00	12 00	12 00	12 00	12 00
Standard Gas Company	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Amsterdam Gas Company	.....	.....	.....	.....	.....	.....	.....	.....	.....

† Single Welsbach. ‡ Double Welsbach.

Gas—

Companies.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
Central Gas Company	$48 00	$46 00	$45 00	$45 00	$45 00	$45 00	$45 00	$30 08 1-3	$29 00	$29 00	$29 00	$28 00
Northern Gas Company	50 00	50 00	50 00	50 00	50 00	50 00	50 00	34 33 1-3	32 00	32 00	32 00	30 00
Yonkers Gas Company	.....	.....	.....	33 70	34 00	30 00	30 00	30 00	30 00	30 00	30 00	30 00
Westchester Lighting Company	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE IV.

Cost of Generating and Distributing Energy.

Station expenses	$217,500 00
Expenses of distribution	100,000 00
Management, office, insurance, etc.	50,000 00
Total	$367,500 00

This makes the cost of generating and distributing electricity 1.27 cents per kilowatt-hour.

"Lost Taxes."

No charge is made for "lost taxes"—such a charge is justifiable only in case the City would be paid additional taxes, if the plant were not built. As a matter of fact, the taxation of the existing companies would not be affected in any way by the operation of this plant.

Inspection of Lamps.

The cost of inspection, trimming, carboning, globe breakage and repairs for arc lamps, and of renewals, metering and general supervision of incandescent lamps, is not included in expenses of distribution above. The cost of maintenance of arc lamps will be $5 per year per lamp, a total of $50,000, and the cost of renewals, etc., of incandescent lamps, .75 cent per kilowatt-hour of station output—a total of $37,500.

Adding these two items to the $100,000 given above for general expenses of distribution, makes the total sum of $187,500 per year for maintenance of the plant, outside of the central station.

Depreciation.

Depreciation is assumed to be equal to eight per cent. of the total of the items of Table III., excluding Items 16, 17, 18 and 19—that is, eight per cent. on the total cost of the plant. This amounts to $202,000 per year for the arc and $82,000 for the incandescent service—a total depreciation charge of $290,000 per year.

It is therefore equivalent to $20.20 per arc lamp per year and to 1.64 cents per kilowatt-hour for the incandescent service.

These amounts are probably considerably in excess of the actual depreciation, and are larger than the value usually assumed to cover this item.

TABLE V.

Cost Per Year Per Arc Lamp.

Energy supply at 1.27 cents	$30 40
Maintenance	5 00
Depreciation	20 20
Interest	10 50
Total	$66 10

TABLE VI.

Cost Per Kilowatt-Hour for Incandescent Service.

Energy supply	1.27	cents.
Maintenance	.75	"
Depreciation	1.64	"
Interest	.72	"
Total per kilowatt-hour at station	4.38	cents.
Total per kilowatt-hour at lamp	5.475	"

Allowance for Outages.

Assuming an average of only 95 per cent. of the arc lamps to be in service, the cost per year, allowing for coal not used, will be $69.40.

The annual cost per arc light with a plant to supply 5,000 arcs will be $80.80, making the same allowances.

The total cost for this plant will be—

Operating expenses	$455,000 00
Depreciation	290,000 00
Interest	147,000 00
Total	$892,000 00

The comparative costs for the two services will be—

Arc Lights.

Present rate	$146 00
Cost with City plant	69 40
Saving with City plant	$76 60

Saving, in percentage of present rate, 52.4 per cent.

Incandescent Lighting.

Present rate, per kilowatt-hour	10.0	cents.
Cost with City plant	5.475	"
Saving with City plant	4.525	cents.

Saving, in percentage of present rate, 45.2 per cent.

The total annual cost at present rates and for a City plant, first for 10,000 arc lights and the present lighting of public buildings; and, second, for 5,000 arc lights and the present lighting of public buildings, will be

Cost of	At Present Rates.	City plant.
10,000 arc lights	$1,460,000 00	$694,000 00
4,000,000 kilowatt-hours	400,000 00	219,000 00
Totals	$1,860,000,00	$913,000 00
Saving with City plant		$947,000 00

Saving, in percentage of present rates, 50.9 per cent.

Cost of	At Present Rates.	City plant.
5,000 arc lights	$730,000 00	$404,000 00
4,000,000 kilowatt-hours	400,000 00	219,000 00
Totals	$1,130,000 00	$623,000 00
Saving with City plant		$507,000 00

Saving, in percentage of present rates, 44.9 per cent.

These tables show that 10,000 arc lamps and the present lighting of public buildings can be operated for about $200,000 less than is now charged the City for 5,000 arc lights and the same lighting of public buildings, and that, approximately speaking, the work can be done for one-half of the present rates.

All the estimates in this report are based on the assumption of economical construction of the plan on a cash basis, and of competent and economical management.

CARY T. HUTCHINSON.

"B."

AND NAPHTHA LAMPS FROM 1858 TO DATE.

Manhattan.

1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
$45 00	$45 00	$45 00	$45 00	$45 00	$42 50 $39 00	$39 00	$33 00	$28 00	$23 00	$19 90	$14 00	$12 00	$12 00
53 00	53 00	53 00	53 00	53 00	42 50 39 00	39 00	33 00	28 00	23 00	19 90	14 00	12 00	12 00
50 00	50 00	53 00	53 00	53 00	42 50 39 00	39 00	39 00	38 95	37 95 1-3	35 32	21 90	21 00	17 70
50 00	50 00	50 00	50 00	50 00	50 00	39 00	33 00	38 00	34 12 1-2	30 00	19 90	19 50	18 28
.....	.....	.....	.....	.....	.....	39 00	35 00	29 16 2-3	25 75	29 75	19 10	16 65	19 00
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Manhattan.

1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	Bid, 1903.
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
$17 50	$17 50	$17 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17 50	17 50	17 50	$17 50	$17 50	$17 50	$17 50	$17 50	$17 50	$17 00	$17 50	$17 50	$17 50	$17 50
							†30 00	30 00	29 00	29 00	29 00	29 00	29 00
							‡47 00	47 00	47 00	47 00	47 00	47 00	47 00
12 00	12 00	12 00	12 00	12 00	12 00	12 00	12 00	12 00	12 00	12 00	12 00	.....	.....
13 04 1-3	13 04 1-3	13 04 1-3	13 04 1-3	13 04 1-3	13 04 1-3	13 04 1-3	13 04 1-3	13 04 1-3	12 90	13 04 1-3	13 04 1-3	13 04 1-3	13 04 1-3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12 00	12 00	12 00

Bronx.

1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	Bid, 1903.
$28 00	$28 00	$28 00	$27 00	$27 00	$27 00	$27 00	$27 00	$24 06	$24 00	$24 00	$24 00	$24 00	$24 00	$24 00	$24 00	$22 00	$22 00
30 00	29 00	29 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	24 00	24 00
30 00	29 00	29 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	28 00	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28 00	24 00	24 00

Electric—

Companies.	1881.	1882.	1883.	1884.	1885.	1886.	1887.		1888.		1889.		1890.		1891.	
Brush Electric Illuminating Company	$255 50	$255 50	$255 50	$255 50	$255 50	$255 50	$91 25	$146 00		$127 75	$164 25	$127 75	$91 25	$127 75	$146 00	$164 25
													105 85	164 25		
United States Illuminating Company	.....	255 50	255 50	255 50	255 50	255 50	87 60	146 00		127 75	91 25	105 85	91 25	105 85		146 00
								182 50				127 75		127 75		
East River Electric Light Company	.....	.....	.....	.....	.....	.....	72 75	142 35		127 75		127 75	91 25	105 85		146 00
														127 75		
Mt. Morris Electric Light Company	.....	.....	.....	.....	.....	.....		146 00		116 80	83 95	87 60	83 95	91 25		146 00
												91 25	87 60	127 75		
American Electric Manufacturing Company	.....	.....	.....	.....	.....	.....		116 80		.....		.....		.....		.....
Harlem Lighting Company	.....	.....	.....	.....	.....	.....	87 60	182 50	$127 75	182 50	127 75	182 50	127 75	182 50	146 00	182 50
								219 00		219 00						
Thomson-Houston Company	.....	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....
Manhattan Electric Light Company	.....	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....
Edison Electric Light Company	.....	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....
Madison Square Light Company	.....	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....
United Electric Light and Power Company	.....	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....
New York Edison Company	.....	.....	.....	.....	.....	.....		.....		.....		.....		.....		.....

* Two lamps on each pole. † Incandescent.

Electric—

Companies.	1886.	1887.	1888.	1889.	1890.	1891.
North New York Lighting Company	.....	$146 00	$127 75	.....	.....	$164 25
North River Electric Light and Power Company	.....	.....	.....	.....	.....	.....
Pelham Electric Light and Power Company	.....	.....	.....	.....	.....	.....
Bronx Gas and Electric Company	.....	.....	.....	.....	.....	.....
Eastchester Electric Company	.....	.....	.....	.....	.....	.....
Westchester Lighting Company	.....	.....	.....	.....	.....	.....
New York Edison Company	.....	.....	.....	.....	.....	.....

† Incandescent.

Naphtha—Manhat

Companies.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
New York and New Jersey Globe Gas Company	$26 66	$20 00	$20 00	.....	.....	.....	.....	.....	$25 00
Welsbach Street Lighting Company of America	.....	.....	.....	.....	.....	.....	.....	.....	.....

† Singie Welsbach.

EXHIBIT "C."

List of Cities whose Lighting is Compared with The City of New York.

New York, Boroughs of Manhattan and The Bronx—

Kind of Lamps Used on Streets—2,000 candle power, open and enclosed; 1,200 candle power, enclosed; 900 candle power, enclosed; incandescent lamps, 25 candle power.

Number Used—At this date the number now installed and being installed is as follows—

BOROUGH OF MANHATTAN.

2,000 candle power, 2,657; 1,200 candle power, none; 900 candle power, 428; incandescent lamps, 25 candle power, 54.

BOROUGH OF THE BRONX.

2,000 candle power, 1,291; 1,200 candle power, 651; incandescents, 378.

Of these lamps, 412 of the 900 candle power lamps in the Borough of Manhattan are erected on the twin lamp-posts and are maintained, so far as candle power goes, as one 1,800 candle power lamp. Nearly all the lamps in New York City are direct current enclosed, or constant current lamps.

Number of Hours of Burning per Year—Electric arc lamps in The City of New York are burned 3,950 hours.

Amount of Current Determining Nominal Candle Power—900 candle power, 230 watts; 1,200 candle power, 320 watts; 2,000 candle power, 425 watts. Except in case of alternating enclosed arc lamps, where 1,200 candle power lamps should consume 350 true watts, and 2,000 candle power lamps, 400 true watts.

Term of Contract—The City of New York can contract for its lamps only for period of one year.

Cost of Fuel—Carload lots, $3.

Arcs on Underground Circuits—In the Borough of Manhattan all arc lamps, except in smaller parks and a very few streets, are underground, making a total of 2,856.

Lamps served by overhead wires, Borough of Manhattan	292
Lamps served by overhead wires, Borough of The Bronx	1,944
Total	2,236

Distance between the lamps varies from 150 feet on the main thoroughfares in the centre of the City to 400 feet in the outskirts.

In the Borough of Manhattan the bid price of these lamps, under these conditions, to The City of New York, including maintenance, supply of carbons and globes, trimming and all repairs, is for 2,000 candle power lamps, $146 each; 1,200 candle power lamps, $125; 900 candle power lamps, used as twin arc, $182.50 per annum for the two; and 900 candle power lamps, used singly, direct low tension enclosed, $102.20 per year; and 25 candle power incandescent lamps, $22.50 each per annum.

In the Borough of The Bronx, under similar conditions as to maintenance and care, 2,000 candle power arc lamps are bid for at $146, 1,200 candle power arc lamps at $125, and 25 candle power incandescent lamps $25.

It will be noted that no difference is made between the prices for underground and overhead service. All the equipment used for electric lighting is owned by the companies supplying same. There are twenty-four 2,000 candle power free lamps in addition to those given above.

Number and price bid for maintenance of gas lamps, open flame, consuming three cubic feet under a pressure of one inch, in the Borough of Manhattan, burning 4,000 hours per year:

8335.—Consolidated Gas Company, $17.50.
1571.—Standard Gas Light Company, $13.04 1-3.
If the lights burn less than 3,833 1-3 hours, the price is $12.50.
2962.—New Amsterdam Gas Company, $12.

This includes supply of gas, maintenance, cleaning, lighting and extinguishing.

The price bid for illuminating gas to the Borough of Manhattan by the same companies is 90 cents per thousand cubic feet.

In the Borough of The Bronx the number and prices bid for gas lamps per year consuming three cubic feet of gas per hour are as follows:

1974.—Central Union Gas Company, $22.
343.—Westchester Lighting Company, $24.
3331.—Northern Union Gas Company, $24.

Gas per thousand cubic feet in the Borough of The Bronx is billed as follows:
Central Union Gas Company, 90 cents.
Northern Union Gas Company, 90 cents.
Westchester Lighting Company, $1.10.

Mantle Street Lighting, Borough of Manhattan.

5832.—Consolidated Gas Company, $29.

Mantle Street Lighting, Borough of The Bronx.

100.—Welsbach Street Lighting Company of America, $30.

Open Flame Naphtha Lighting, New York and New Jersey Globe.

1439.—Gas Light Company in Manhattan and The Bronx, $22.

The above bid prices include maintenance, lighting, cleaning and extinguishing. In open flame naphtha lighting the entire equipment belongs to the company. In mantle naphtha lighting the entire equipment belongs to the company. In mantle gas lighting the lamps and burners belong to the company, the lampposts belonging to The City of New York. In open flame gas street lighting the burning appliances, including cocks, tips, columns, belong to the company, the lamps and lampposts belonging to the city.

The price bid for gas per thousand cubic feet gives the price charged by the companies for gas lighting in public buildings.

Electric Service of Public Buildings.

Electric current furnished to the City in the boroughs of Manhattan and The Bronx is bid for at the following rates:

New York Edison in Manhattan, 12 cents; for very large and continued consumption, 10 cents for first three hours and 5 cents for balance, making an average as billed to The City of New York of 9.7 cents per kilowatt hour.

United Electric Light and Power Company bids 15 cents, 10 cents and 5 cents, as follows: 15 cents for first two hours, 10 cents for next two hours, and 5 cents for all over that time, except in special instances, notably the Department of Charities, where it charges 10 cents, and in the case of Bellevue Hospital, where the consumption is very large, it charges 10 cents for the first three hours, 5 cents for the balance, with 10 per cent. off the net price. The average billed price to the City is 8 cents.

In The Bronx the New York Edison Company bids on a basis of 15 cents for the first two hours, 10 cents for the second two hours, and 5 cents for all over that consumption. In cases of extra large consumption, as at North Brother Island, it bids 10 cents for the first three hours and 5 cents for all over that. The average price to the City as billed is 11.4 cents.

The Bronx Gas and Electric Company charges 10 cents per kilowatt hour flat.

The Westchester Lighting Company charges 15 cents per kilowatt hour flat.

In both boroughs the total number of kilowatt hours consumed this year, from the 1st of January to the 1st of November, divided by the amount charged for same with proper corrections for error, makes the total average of the entire two boroughs 9.96 per kilowatt hour.

Subway Construction—No reliable information in regard to cost of underground construction in The City of New York could be obtained by this Bureau.

Manhattan.

1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	Bid, 1903.
$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00 $164 25	$146 00	$146 00
	182 50										
146 00	146 00 182 50	146 00	146 00	.....	.....	.....	.....	.....	.....	.....	.....
146 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
146 00	146 00	146 00	146 00	146 00	146 00	146 00	†22 50 146 00	†22 50 146 00	22 50 146 00	.....	.....
							164 25	164 25	164 25		
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	.....	.....
.....	146 00 182 50	146 00 182 50	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	146 00 182 50	146 00	146 00	146 00	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	146 00 182 50	.....	.....
.....	*182 50	182 50	182 50	182 50	146 00 182 50	146 00 182 50	146 00 182 50	109 50 146 00	22 50 109 50	.....	.....
								182 50	146 00 182 50		
.....	.....	.....	146 00 182 50	146 00 182 50	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	146 00	146 00
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$22 50 109 50	$22 50 182 50
										146 00 182 50	102 20 146 00

Bronx.

1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	Bid, 1903.
$164 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	$164 25	$164 25	$164 25	$164 25	$164 25	$164 25	$164 25	†$25 00 $164 25	$25 00 $164 25	.....	.....
.....	.....	.....	.....	.....	.....	146 00	146 00	146 00	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	125 00	125 00	$125 00	$125 00
.....	.....	.....	.....	.....	.....	.....	†25 00	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	146 00	146 00	146 00
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	†$25 00 146 00	$25 00 146 00

tan and The Bronx.

1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	Bid, 1903.
$25 00	$25 00	$25 00	$23 00	$22 50	.....	$22 00	$22 00	$22 00	$22 00	$22 00	$22 00	$21 33 $22 00	$22 00	$22 00	$22 00	$22 00	$22 00
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	†30 00	30 00	30 00	30 00	30 00

PHILADELPHIA—

Kind of Lamps Used on the Streets—2,000-candle power open series arc lamps only.

Number Used—9,282 and 144 free. Total, 9,426.

Number of Hours of Burning per Year—Electric arc lamps in the City of Philadelphia are burned 4,095 hours.

Amount of Current Determining Nominal Candle Power—Lamps used in the City of Philadelphia are open series arc lamps, consuming 9.6 amperes at 50 volts.

Term of Contract—The City of Philadelphia contracts for its lamps only for periods of one year.

Cost of Fuel—$2.75 car load lots.

Arcs on Underground Circuits—850 lamps served.

Lamps Served by Overhead Wires—8,100.

Average Number of Arc Lamps per Mile Street Now Lighted—Approximately the same as New York.

The cost of these lamps to the City of Philadelphia is at various rates—the average cost being $110.56. In some cases the City of Philadelphia uses its own subways and cables, thereby obviating this expense to the company. There is a difference also in some of the overhead prices due to questions of locality, which make four different sets of rates, as follows·

Where city's cables and conduits are used $102.20 per year per light.

Where company supplies its own cables and conduits $116.80 per year per light.

For overhead service south of Alleghany avenue $109.50 per year per light.

For overhead service north of Alleghany avenue $113.15 per year per light.

The average rate for all lamps is $110.56 per year per lamp.

It will be noted that no difference is made for overhead or underground service as regards the price of arc lamps, except where part of the equipment belongs to the City.

Rates for Maintenance of Gas Lamps—The City of Philadelphia had a municipal gas lighting plant. This plant was leased to the United Gas Improvement Company of Philadelphia. Among other considerations given to the City to obtain this lease was that the United Gas Improvement Company light and maintain 20,678 gas lamps, reported as burning five cubic feet per hour, free of cost.

Mantle Gas Street Lighting—In March, 1903, it was reported that no mantle gas lamps were used in Philadelphia.

Mantle Naphtha Street Lighting—Philadelphia uses 5,411 of these lamps and pays $29.50 per lamp per year.

Open Flame Naphtha Lighting—Philadelphia uses 7,076 of these lamps and pays $21.50 per year.

It is not stated to whom the equipment belongs in these particular instances.

Price of Gas Per Thousand Cubic Feet for the Use of Public Buildings—It is reported that gas is furnished for the public buildings per thousand cubic feet free of cost to the city.

Rate of Electric Service for Public Buildings—This rate is reported as net to the city of Philadelphia, 6 cents per kilowatt hour.

This could not be checked, as there is a great deal of free lighting given in Philadelphia. For instance—most of the Fire and Police Stations are lighted free. Comparatively speaking, the lighting of public buildings is very small, and the total amount expended by the city of Philadelphia in 1902 for the use of current, extensions and repairs to incandescent electric lighting is $13,944.72.

In Regard to Subway Construction—The ground underlying the city is practically clay. In excavating for the subways they excavate clay, sand and some rock. The city built certain portions of the subway of wood and clay conduits of 2½ and 3 inches in diameter. They report the total cost of laying conduits, including manholes, is $1,200 per duct per mile. It rents its conduits for $250 per duct mile per year. They find that the cost of keeping these ducts in repair is about two-tenths of one per cent. of the cost. They charge 5 per cent. interest and 2 per cent. depreciation on the investment incurred for the subway. They state that the cost of connecting arc lamps to the conduit system is about $90, including pole, and that a total of 530 duct miles of conduit have been installed.

ST. LOUIS—

Kind of Lamps Used on Street—2,000 candle-power series of direct constant current, enclosed.

Number of Lamps Used—968.

Hours Burning Per Year—Arc lamps in the city of St. Louis burn 4,055 hours.

Term of Contract—The city of St. Louis contracts its lamps for a period of ten years.

Cost of Fuel—Delivered at the works $1.90, car load lots.

Arcs on Underground Circuits—328.

Arcs on Overhead Wires—640.

Average Number of Arc Lamps Per Mile Street Now Laid—About 9½.

Cost of Arc Lamps Per Lamp Per Annum, Whether Served by Underground Wires or Overhead Wires—$96.38.

It will be noted that no difference is made for overhead or underground service as regards the price of arc lamps.

Amount of Current Determining Nominal Candle-Power—Contract for the city of St. Louis calls for the greatest amount of illumination when 480 watts of electrical energy is expended in the arc, i. e., between carbons.

Cost Per Kilowatt Hour for Incandescent Lamps—The city of St. Louis uses incandescent electric lamps for lighting the alleys, and pays 479-1,000 of one cent. per hour for a 30 candle-power lamp, burning 4,055 hours during the year. About 6 cents per kilowatt hour.

Incandescent lighting is supplied in buildings by two companies under two different contracts. One contract is at the rate of 7.5 cents per kilowatt hour; the other contract is at the rate of 8 cents per killowatt hour.

The city of St. Louis uses 10,139 mantle gas lamps for lighting the city. These lamps are furnished at $28 apiece per annum, and this price includes repairs, maintenance, lighting and extinguishing. The price of gas in general is given as—for illuminating purposes, $1; for fuel purposes, 80 cents.

In Regard to the Subway Construction—The city of St. Louis is built mainly on clay. The city did not build any ducts of its own, except a mile and a quarter of two-duct construction during last year, and this is used for fire alarm, police and telegraph wires. The subway construction of the city was built by the companies lighting the city. The size of ducts used is 3¼ inches. The kinds of conduits used is about half cement-lined iron pipe and half of vitrified clay conduits. They use about 20 manholes to the mile and 40 service boxes to the mile.

As to the Total Cost of Conduits, Including Manholes and so on—On or about April 1, 1902, there was installed in the City of St. Louis approximately 3,864,024 feet of duct of the character mentioned above.

The cost of contract construction is given us in great detail according to the number of ducts used.

For an 18 duct, which is a normal size, these would cost $2.62143 per foot, or $13.841 per mile and $1.000 about per single duct mile, including manholes, etc.

Manholes cost from $110 to $174 each, depending on size, being 5 feet square by 6 feet 6 inches deep in the clear, or 9 feet square by 6 feet 6 inches deep in the clear. The service or junction boxes, 3 feet square and 2 feet deep, cost $30 each. The above prices include draining of all manholes, and so on.

For extra digging, refilling and repaving, or for trenching for house connections, a charge of 40 cents per linear foot is made. The contractors under this contract do all the repaving to the entire satisfaction of the city.

The paving in St. Louis is about 95 per cent. belgian blocks and 5 per cent. asphalt.

The electric lighting and telephone companies operating underground in the City of St. Louis, are compelled to provide for the City of St. Louis, free of charge, 1 duct in each trench. The cost of keeping conduits in repair is reported as 3-100 of one per cent. per foot per annum. No depreciation is charged for on account of

subway. Lateral conduits, running from the main conduit to the lamps, and so on, cost about 50 cents a foot, including 3-inch iron pipe, digging, refilling and repaving. The cost of connecting arc lamps to the subway system, assuming that the manholes and service boxes are built, is about $52.84, including cost of pole.

Conduits are installed in St. Louis under what is known as the "Keyes Ordinance." This ordinance requires all lighting and high tension companies to build jointly in a common trench occupying one side of the street. All telephone and low tension companies to build jointly and occupy a common trench on the other side of the street. The manhole cost is divided between the companies in proportion to the duct openings of each company into the manhole.

BOSTON—

Kind of Lamps Used on Street—2,000 candle power, inclosed; incandescent lamps 25 candle power.

Number Used—3,670 2,000 candle power and 36 incandescent lamps.

Number of Hours Burning per Year—3,828.

Amount of Energy Determining Nominal Candle Power—464 watts at arc.

Term of Contract—Five years.

Cost of Fuel in Car-load Lots—$3.09.

Arc Lamps on Underground Circuits—1,453.

Arcs on Overhead Wires—2,217.

Distance Between Lamps—Varies from 150 feet on the main thoroughfares to 400 feet and over on the outskirts.

In the City of Boston, the cost of lamps is on a sliding scale, as follows:

Number of Lights.	Price per Night.	Price per Year.
For not less than 2,365 nor more than 2,749	$0 35	$127 75
For not less than 2,750 nor more than 2,999	34½	125 92
For not less than 3,000 nor more than 3,249	34	124 10
For not less than 3,250 nor more than 3,499	33½	122 27
For not less than 3,500 nor more than 3,749	33	120 45
For not less than 3,750 nor more than 3,999	32½	118 62
For not less than 4,000 nor more than 4,249	32	116 80
For not less than 4,250 nor more than 4,499	31½	114 97
For not less than 4,500 nor more than 4,749	31	113 15
For not less than 4,750 nor more than 4,999	30½	111 32
For not less than 5,000	30	109 50
Average price, 1902 Report		123 54

Where such arc lights are furnished by underground wires belonging to the City in public parks, the price shall be $0.01 per lamp per night less than the price hereinbefore provided. You will note that 5,000 lamps at this basis would cost $109.50. This is about the number of lamps being used in the Boroughs of Manhattan and The Bronx to-day.

It will be noted that no difference is made between the price for underground and overhead service, except where City apparatus is used. The equipment used for electric lighting outside of a few isolated instances in the parks, as mentioned, practically belongs entirely to the company.

Rates for Maintenance of Gas Lamps in Boston—Boston apparently adopted the Welsbach system of gas lighting entirely in June, 1899. It would appear that the city of Boston follows the same practice as New York, in that it supplies the gas lamp-posts and service and stand-pipes from the mains to the burner. The price paid for these lanterns burning 3,828 hours is $30 per year per lamp. This price includes the gas, maintenance, repairs to lanterns, cleaning, lighting and extinguishing.

Under date of February 16, 1903, the Superintendent of Lamps reported that there were 9,248 Welsbach gas lamps in use at $30 per year per lamp. The price for illuminating gas to the city of Boston for use in public buildings per thousand cubic feet is 70 cents to $1, depending apparently upon the amount consumed.

Naphtha Lighting—Boston uses three types of naphtha lamps. They had in use at the beginning of 1903, 55 Kitson naphtha lamps, at $85 per year each; 440 Welsbach mantle naphtha lamps, at $30 per year each, and 1,658 open-flame naphtha lamps, at $22.81 each, all under the same conditions as gas lamps.

Electric Service to Public Buildings—The rate for incandescent lights furnished to public buildings is given as $0.01 per lamp hour, or the equivalent in this City to 16 cents per K. W. hour.

Subway Construction—Very little information could be obtained in regard to subway construction in Boston, but I quote from the message of the Mayor of Boston of date February, 1900, in which a report was printed from Mr. N. Matthews, Jr., in which it is stated: "Another peculiar feature of the situation in this city is the obligation imposed upon the company to place a large percentage of its wires underground. Statutes of 1894, chapter 454, provided that all wires in the territory south of Dover and Berkeley street, will be placed underground in not less than four or more than six years. In compliance with the provisions of this act the company has already expended about $800,000 in placing 40 per cent. of its wires underground, and will have all of that in the district covered by the act beneath the surface before the end of the current year at an estimated total cost of $900,000. Statutes of 1898, chapter 249, provides that during the next ten years much of the overhead wire system, outside of the district embraced in the Act of 1894, shall also be removed and placed underground. Under this act the company expects to be obliged to place from 10 per cent. to 20 per cent. more of its system underground, at an estimated additional expense of several hundred thousand dollars. The company's officers estimated that the total expense involved by compliance with these two laws would be $1,300,000 to $1,500,000, and that at the end of the next five years the company will have 60 per cent. of its wires underground, and at the expiration of the ten-year period, 70 per cent. The cost of laying underground conduits is claimed by the company to be greater in this city (Boston) than anywhere else, owing to the narrowness and crookedness of the streets, and to the fact that the entire space from curb to curb in the streets is filled with structures of every sort to such an extent that it is very difficult to get new pipes or conduits down unless they are put in at a great depth and at a great expense. From what I know of the condition of the streets of this city below the surface, I should say that this claim was probably well founded, in so far as the streets in the business sections are concerned."

For purposes of comparison, Mr. Matthews states further, that, in his opinion, the cost of this subway construction, so far as it applied to the arc lamps in the city of Boston, increased the cost of installation for arc lamps about $325 more per light than the overhead system. He figures the cost of an overhead system about $300 per light, and consequently the total cost of an underground system of these arc lights would be $625 per light. This, as you will note from the quotations first given, is, in his opinion, a high price on account of the great difficulty of underground work in Boston, and it is valuable for purposes of comparison with such parallel data as we have.

At the time of this report Boston was using 2,044 arc lamps, of which 1,506 were lighted by overhead system and 538 by underground system, and in the parks at this time, on an underground system furnished by the City, the company was supplying 321 arc lights in addition to the above, and, of course, also the cables, conduits and wires to and from the City circuits in the Park. This would make a total of 1,506 lamps overhead and 859 lamps on the underground system, a total of 2,365 lamps. At the present time Boston has 3,670 lamps, of which 39.5 per cent., or 1,453, are underground.

BALTIMORE, MD.—

Kind of Lamps Used on Streets—2,000 candle power open and enclosed.

Number Used—1,625.

Number of Hours of Burning per Year—Electric arc lamps of the City of Baltimore are burned 4,000 hours.

Amount of Energy Determining Nominal Candle Power—There are 1,175 open series arc lamps taking 480 Watts per lamp and 450 enclosed lamps taking 462 Watts per lamp.

Term of Contract—Baltimore contracted for its arc lights for a period of 5 years from September 19, 1900.

Cost of Fuel—Car-load lots, $3.

Arc Lamps on Underground Circuits—The City of Baltimore has 180 arc lamps served by underground wire.

Arc Lamps Served by Overhead Wires—1,445.

Distance between arc lamps varies from about 200 feet to 300 feet apart on the main thoroughfares. Cost of these arc lamps to the City of Baltimore, including maintenance, and so on, is $99.92, whether served by underground wires or overhead wires.

The equipment used for electric light is owned by the company supplying same, except that the city built its own subway and owns it, at the prices given under the heading of Subway Construction.

Rates for Maintenance of Gas Lamps—The City of Baltimore uses mantle system of lighting practically entirely. These mantle lamps are furnished by the American Lighting Company as follows:

Single mantle gas lamps, 6,174, at $21.40; 242, at $17, and 89, at $19.25, and this includes supply of gas, maintenance, cleaning, lighting and extinguishing.

As in New York the lamp-posts are furnished by the city, but the American Lighting Company buys its gas of the company furnishing same in Baltimore, and includes same in the total price charged, as above.

The price for the illuminating gas for use in public buildings in the city is $1 per thousand cubic feet.

Naphtha Lighting—Furnished by the American Lighting Company; has mantle naphtha lamps 1,109 in number, at $23.45.

Electric Service to Public Buildings—Electric current is furnished to the city at 10 cents per kilowatt hour with such discounts for quantity consumed that the city pays a net price per kilowatt hour of 6.3 cents.

Subway Construction—The City of Baltimore built its own subways and reports that the City is built on clay and gravel. The size of the ducts and its conduits are 3 inches in diameter, and they are placed about 18 inches deep. They cost 22.4 cents per duct foot, including every item except poles. This would make the cost per duct mile $1,182.72. They use clay conduits. The City rents the use of its conduits as follows:

For 5,000 duct feet, $0.065 per foot.

For 25,000 duct feet, $0.06 per foot.

For 50,000 duct feet. $0.055 per foot.

For 100,000 duct feet, $0.05 per foot.

This would approximate a charge of $325 per duct mile. The depreciation charge on same, as in the case of St. Louis, is stated to be so small that it would be negligible.

Baltimore has had some difficulty in regard to the cost of its lighting, and on January 4, 1900, a commission was appointed to examine and report on same. A copy of this report was procured and the final paragraph of it, with its recommendations, is quoted here:

"Accordingly your commission, while refraining at this stage of inquiry from asserting that a municipal lighting plant is desirable, have made careful study of the maximum cost of establishing such a plant in order that enabling legislation may be obtained from the present Legislature. By this means the city will not only be put in a position to proceed without needless delay if municipal construction be deemed expedient, but will distinctly improve its strategic position in negotiations for cheaper service with the present lighting companies. The amount required for the erection of a municipal electric lighting plant adequate for the present needs and for the reasonably anticipated future needs of Baltimore is $1,350,000.

"That the city procure from the Legislature an act authorizing it to issue stock to the amount of $1,350,000 to provide funds for the erection of a municipal lighting plant so that in the event of its determination to erect a plant the delay of two years will be avoided."

At this time the City of Baltimore was paying $127.75 per light per annum for lights on overhead wires. The Legislature passed an act enabling the city to build a municipal plant if it desired. Immediately on the passage of this act the electric light companies reduced the price of its light, either for overhead or underground construction to the present price. No municipal plant has been installed, nor would there seem to be a necessity for same.

CLEVELAND, OHIO—

Kind of Lamps Used on Street—2,000 candle power open series and enclosed arc lamps.

Number Used—1,098.

Number of Hours Burning Per Year—3,760.

Amount of Energy Determining Nominal Candle Power—440 to 480 watts.

Term of Contract—City contracts for its lights for a period of one year.

Cost of Fuel—Carload lots, $2 to $2.25.

Arcs on Underground Circuit—109.

Arcs on Overhead Circuits—989.

Distance between lamps varies from 200 feet in the main thoroughfares of the city to 500 feet in the outskirts.

The cost of these lamps include maintenance, and so on, and is the same whether served by underground wires or overhead wires, paying $75 per lamp per year. The equipment apparently belongs to the companies furnishing the lamps.

Rates for Maintenance of Gas Lamps—Cleveland uses mantle gas lamps entirely. It is reported to us that there are 5,452 lamps of 50 candle power each burning 3,760 hours per year at a cost of $24.56, divided as follows: $16.10 for maintenance per year each; $8.46 for gas per year each.

Mantle Naphtha Lighting—Cleveland uses 2,476 of these lamps of 50 candle power each, burning 3,760 hours per year, and pays $22.37 per lamp per year. The city owns the lamps in this case.

The price of gas per thousand cubic feet when used in public buildings is 75 cents.

Electric Service in Public Buildings—Incandescent lights when used in public buildings are paid for at the rate of 12½ cents per kilowatt hour.

Subway Construction—No very useful information for subway construction could be obtained. Cleveland does not own its own subways. They are owned by the telephone, telegraph and electric light companies. They use tile ducts of four inches in diameter. The City has a proviso with each company owning subways, however, that it may at any time use the conduits without any charge to the City, but up to the present time no advantage has ever been taken of this. The City is built on sand and clay with a slight stratum of shale in the outskirts, so that practically all subways are excavated in sand and clay.

A considerable agitation has taken place in Cleveland in the last few years in favor of municipal ownership. A report of the Chamber of Commerce in connection with this is not in favor of same, on the grounds that the city is now getting light as cheap, if not cheaper, than could be produced by a plant operated by the city itself. The price which Cleveland has paid for the last few years is given as follows:

1896, 2,000 candle power, all night service, $94.80.

1897, 2,000 candle power, all night service, $93.24.

1898, 2,000 candle power, all night service, $93.24.

1899, 2,000 candle power, all night service, $89.88.

1900, 2,000 candle power, all night service, $87.60.

1901, 2,000 candle power, all night service, $82.92.

1902, 2,000 candle power, all night service, $82.92.

1903, 2,000 candle power, all night service, $75.00.

It would hardly seem, under the circumstances, as if a municipal plant was required.

CINCINNATI, OHIO—

Kind of Lamps Used on Street—1,000 to 1,200 candle power.

It is somewhat hard to determine, according to our standard, just what nominal candle power they are, as they consume 300 watts per lamp. They are alternating current series lamps.

Number Used—According to the annual report there were in operation December 31, 1903, 4,347 lamps.

Number of Hours of Burning per Year—3,819 hours.

Amount of Energy Determining Nominal Candle Power—The arc lamps used are specified to consume 4 amperes of current at a difference in potential of 75 volts, or to take 300 watts of energy. According to our data we would figure these lamps gave 1,000 candle power. Cincinnati, however, classes them as 1,200 candle power.

Term of Contract—10 years from June 1, 1902.

Cost of Fuel—Carload lots, $2.
Arcs on Underground Circuits—920.
Lamps Served by Overhead Wires—3,427.
Distance Between Lamps—Varies from 200 to 400 feet in the business portion of the city, and are not allowed to be over 300 feet apart; in the residence sections not allowed to be over 400 feet apart. The price for these arc lamps is $72 per lamp per year in the underground district, and $60 per lamp per year in the overhead district.
All the equipment of these lamps belongs to the company supplying the same.
Rates for Maintenance of Gas Lamps—Number of open flame gas lamps burning December 31, 1902, single burner, 1,054, and 1,237 mantle lights. Average cost of each lamp, $18.99. Average price of gas per thousand cubic feet, 72 3-5 cents. The cost of gas supplied to public lamps for each month is determined in the City of Cincinnati by taking the average cost of gas in the Cities of New York, Pittsburg, Baltimore, Louisville and New Orleans, for each month in the year, averaging the result, and taking two-thirds of it as its cost, viz.: 72 3-5 cents.
Naphtha Lighting—The City of Cincinnati uses 762 open flame naphtha lamps. The average cost of each lamp is $15.95.
The price of gas per thousand cubic feet is the same as that charged for gas to public lamps.
Electric Service to Public Buildings—None is used.
Subway Construction—No reliable information in regard to cost of subway construction could be obtained.

NEW ORLEANS—
Kind of Lamps Used on Street—2,000 candle power open series arc.
Number Used—1,665.
Number of Hours of Burning per Year—The returns do not give this exactly to an hour. The lamps burn all night and every night in the year.
Amount of Energy Determining Nominal Candle Power—450 watts.
Term of Contract—The City of New Orleans has been under a contract for ten years, which ended early in 1903, and after this had expired let a temporary contract of two years' duration, pending investigation as to rates and a municipal plant.
Cost of Fuel—Carload lots, $2.50 per ton.
Number of Arc Lamps on Underground District—50.
Number of Arc Lamps on Overhead District—1,615.
The distance between lamps varies from about 200 feet in the centre of the city to 400 and 500 feet in the outskirts. The cost of these lamps under the old ten-year contract expiring about the first of 1903 was $127.75 per arc lamp. Under the temporary contract for two years, beginning early in this year, pending an investigation as noted, the price was $100 for the same service as previously given for $127.75. Since then the New Orleans Railway Company furnishing light to the City has made a proposition on a proposed increased number of lamps, figuring against the municipal plant theory on the following schedule and for a ten-year contract period:
Lamps Served by Overhead Wires, per Annum—1,600 to 1,800, $85 each; 1,800 to 2,000, $82.50 each; 2,000 to 2,250, $80 each; 2,250 to 2,500, $77.50 each; 2,500 and over, $75 each.
For Lamps in the Underground District—50 to 100, $100 per lamp per annum; 100 to 200. $97.50 per lamp per annum; 200 to 300, $95 per lamp per annum; 300 to 400, $92.50 per lamp per annum; 400 and over, $90 per lamp per annum.
The city desires 2,218 lamps on overhead service at $77.50 and 409 on underground service at $90. This proposal was referred by the city to its engineers, and report by them was made September, 1903. Final action has not yet been taken by the city government.
The equipment to be used for electric lighting would be owned by the company. On the schedule given above they make their bid on the series enclosed alternating arc lamp.
Rates for Maintenance of Gas Lamps—No gas is used for lighting the streets or public buildings by the City of New Orleans.
Electric Service in Public Buildings—Electric current is furnished to the City of New Orleans under a temporary contract of two years now in force, at 12 cents per kilowatt-hour.
Subway Construction—No reliable information in regard to the cost of underground construction in the City of New Orleans could be obtained by this Department, but I should judge from the fact that New Orleans is very low in its subway construction would be very difficult on account of water.
New Orleans made a very careful and searching investigation of the cost of street lighting. Like Baltimore they adopted a plan of open and fair investigation, and they have accomplished about the same results, although the Legislature so far has not authorized a municipal plant, as it did in the case of Baltimore. They found that the cost of construction of a plant which would supply 2,600 arc lamps and 1,500 incandescent lights would amount to about $880,000. The average cost per arc lamp is about $336, which compares favorably with the costs of municipal plants in Chicago, Detroit and Alleghany. They find that the cost of operation would be $124,247, which would make the cost of producing the lamp equal to $46.25, after which they add interest on investment at 5 per cent., for depreciation 7 per cent., and for taxes lost to the city on investment the sum of $1.86 per light, making a total cost for operating a lamp per annum $88.76. The following is quoted from their report:
"We desire to advise you that we approached the subject under consideration with unprejudiced minds, and have faithfully sought all matter which would guide us in framing this report.
"We therefore respectfully recommend that before deciding that the city build and operate an electric lighting and power system, bids for lighting by contract be invited under specifications embracing, for a period of ten years, the same service we have proposed would be established by the city. A fair comparison can then be made of what the experience of the city will be at the end of ten years under a municipal ownership plan and a contract plan.
"We are mindful of the general principle that municipal ownership and control of public utilities is a proper governmental function when logically exercised, yet the expediency of such ownership and control should be determined without regard to sentiment, but on business principles alone.
"The City of New Orleans is now doing almost precisely what was done during the year 1900 by the City of Baltimore. A most searching investigation was conducted by a commission appointed for the purpose, and an estimate made of what the experience of the City would be under municipal ownership and control, but before undertaking such a project bids were invited and prices received which rendered the municipal plan inexpedient."
The date of the report above referred to is September 10, 1901.
On June 1, 1903, the New Orleans Railway Company made a bid based on the very report quoted above. This bid is given in previous paragraph. The proposition from the New Orleans Railway Company was very carefully considered by City Engineer Hardee and City Electrician Olroyd. They report that a comparison between this bid and municipal ownership is as follows:
The cost to the City per annum for lighting and their electric service under the two plans would be:

New Orleans Railway Company contract plan	$229,006 10
Municipal ownership and control	220,669 23
Annual saving to the City	$8,336 87

This is a very slight difference, and one which might be changed from unforeseen accident to a municipal plant. It was so close a decision that the two Engineers referred to did not agree and they submitted individual recommendations.
City Engineer Hardee reports in favor of municipal ownership and City Electrician Olroyd rather prefers the estimate of the New Orleans Railway Company and asks for final binding bid in order to obtain exact and conclusive figures. However this matter may ultimately be determined, New Orleans will save a very large amount of money on its lighting in the future.

WASHINGTON—
Kind of Lamp Used on Street—2,000 candle power enclosed arc lamps. All constant current, and 25 candle power incandescent lamps.
Nominal Candle Power of Each Lamp—2,000.
Number Used—On July 1, 1903, there were in operation 965 arc lamps and 601 25 candle power lamps.
Number of Hours of Burning per Year—3,942½.
Amount of Energy Determining Nominal Candle Power—450 watts.
Term of Contract—No contract is made.
Cost of Fuel in Car Load Lots—$3 to $3.50.
Arcs on Underground Circuits—All arc lights in the City of Washington are served by underground wires except a very few.
The distance between the lamps varies from 200 feet on the main thoroughfares to 500 feet on the outskirts.
Up to 1894 the City of Washington had been paying for its arc lights at the rate of $182.50, but since then the prices were very largely reduced. Last year the price was $72, but this year was made $80 per lamp per annum.
The 25 candle power incandescent lamps cost $20 each per annum. All the equipment used for electric lighting is owned by the companies supplying same.
Rates for Maintenance of Gas Lamps—The City of Washington uses 6,989 gas lamps, consuming 5 cubic feet per hour, and pays for same at the rate of $20 per year per light.
It also uses 25 fire alarm lanterns, consuming 2½ cubic feet per hour at $12.50 per annum, and 90 street sign lanterns, consuming 2½ cubic feet per hour, at $12.50 per annum.
Recently the American Lighting Company has been awarded a contract for mantle gas lighting. I have not the exact figures before me, but I am informed that the price is between $23 and $25 and the number of lamps is about 500.
The rate for gas in public buildings in the City of Washington is $1 per thousand cubic feet.
Open Flame Naphtha Lighting—The City of Washington uses 1,244 twenty candle power open flame naphtha lamps and pays for same at the rate of $18 per lamp.
The above price includes maintenance of lamps, lighting, cleaning and extinguishing. With the exception of the lamp-posts and lanterns, practically all the equipment belongs to the company.
Recently Congress has ordered that gas lamps as specified above should be supplied at $20 per year, and the companies to furnish all equipment.
Electric Service in Public Buildings—The highest rate the company is allowed to charge is 10 cents, but all City buildings pay 6 cents per kilowatt-hour.
Subway Construction—The City of Washington is built on clay, and consequently that is all that is required to be excavated. The City only built a very few subways with from one to two ducts, terra-cotta pipe, the diameter of the duct being 3½ to 4 inches. They are used for telephone and telegraph purposes only, not for lighting. The City requires that companies building conduits shall provide three conduits for its use in every instance, no matter how few or how many conduits are laid for their own use.
The following information was obtained in regard to conduits laid by the Electric Light Company. On the average, for arc lighting purposes, when laid in considerable numbers, 3½ inches in diameter, the cost of laying same is from 20 to 25 cents per duct foot, exclusive of repaving, which costs about 35 cents per square foot.
Manholes are placed about 300 to 400 feet apart, and cost $65 for a 5 by 5 by 5 foot manhole. Small service boxes are placed at each arc lamp-post near the curb, opposite to the pole. The cost of pole, connection and box is about $60 each.
The companies do not rent conduits to anyone. They provide the City with three ducts in each trench free. They figure that the depreciation is one-half of one per cent. The conduits are laid 18 inches below the surface. The electric light conduits are laid on each side of the broad streets, very close to the curb, so that lateral conduits to the lamp-posts are very short, and the cost of same not important.
It will be noted that the City of Washington is governed by Congress through a commission. Congress regulates the rates which it pays for the lights and makes rates quite favorable to the City of Washington. From its decisions, of course, there is no appeal.

CHICAGO—
The City of Chicago maintains its own plant. The cost of lighting under this plant has been discussed in previous reports. For comparison with New York, the question of lighting Chicago is taken up on the assumption that it rented all its lights from the Chicago Edison Company according to the rates they offer. The 1902 Report of the Department of Electricity of the City of Chicago states "That the Edison Company would have contracted for its lights on the overhead wires at $103 per annum; on underground wires at $137.50 per annum." The lights that they would furnish at these figures are 2,000 candle-power, open or enclosed arc lamps. The price is the same practically for any number furnished.
Chicago rented in 1902 from the Chicago Edison Company 668 arc lamps of 2,000 candle-power each. The number of hours these lamps burn per year is 3,900. The amount of energy determining the nominal candle-power is 450 watts.
The term of contract is practically from year to year, as in New York.
Chicago also supplies 4,640 lights of its own of 450 watts each, and burning 4,000 hours.
Their report states how many of their own lamps are underground at present, by saying that if the lights which it furnishes itself were taken from the Edison Company, 2,754 would be served by overhead wires and 1,754 would be served by underground wires. If the same proportion were followed throughout of all its lights as given at the end of 1902, namely, 5,308, there would be served by underground wires 1,904 lamps, and by overhead wires 3,404 lamps.
I should judge from the total cost of the rented lights, however, that these lights were mainly overhead.
The distance between lamps is about the same as in the City of New York.
The equipment for furnishing electric arc light is furnished by the Edison Company where contracts are made with them.
Rates for Maintenance of Gas Lamps—The City of Chicago had in service 25,067 gas lamps of all kinds.
According to their reports gas apparently costs $14.10 per burner per year. Maintenance, lighting, cleaning and extinguishing, including office expenses, and so on, costs $5.15 per year. For repairs, glazing, mantles, chimneys, reducers, regulators, tips, globes, shop materials, tools and salaries, it costs $1.05 per lamp per year, which would make the total cost to Chicago of all kinds of gas lamps, whether mantle or plain, about $20.30 per year.
They have 13,895 open flame burners and 11,172 mantle burners. The open flame burners consume 5 cubic feet of gas per hour as against 3 of New York. The mantle burners consume 3 cubic feet in each City.
Data is not given which enables us to exactly establish the cost of each kind of lamp.
In conversation with Mr. Ellicott, City Electrician, it was stated to me that the cost of an open flame burner is $16.15, and for a mantle burner $18.55.
The price of gas in public buildings is given as $1.00 per thousand c. f., but this information has been obtained from sources other than their report, and has not been confirmed.
Electric Service in Public Buildings—The rate for this is not given.
Subway Construction—Chicago built its own subways for electric light service in its streets. Their highest cost, according to their report in 1902, was $1,863.84 per duct-mile, including manholes and all labor and material.
It will be seen by the difference in the price in Chicago Edison Company's charges to the City of Chicago that the additional charge for an arc lamp served by underground wires over that of the same lamp served by overhead wires is $34.50.

DETROIT—
Detroit is lighted by a municipal plant. As in this Report the prices of other cities with New York are only compared where they contracted for their lights, the lighting data of Detroit is not given, as it has been detailed very fully in our previous report and in the current electrical magazines of the day, but I draw attention to the fact that the cost of conduit in Detroit for single duct, including manholes, is 32.5 cents per duct-foot, or $1,716 per duct-mile. The conduits vary in size from two ducts to 24 ducts, and the ducts are special 3½-inch vitrified clay tile laid in concrete
The City of Detroit rents its ducts at the following rates:
Single ducts at 5 cents per foot per annum.
For two ducts paralleling each other, 9 cents for two per foot per annum.
For three ducts, 12 cents for three per foot per annum.

PROVIDENCE, R. I.—

Kind of Lamps Used on Streets—2,000-candle power open direct current and 32-candle power incandescent lamps.

Number Used—2,074.

Number of Incandescent 32 Candle Power—1,860.

Number of Hours of Burning per Year—4,000.

Amount of Energy Determining Nominal Candle Power—450 Watts.

Term of Contract—Six years.

Cost of Fuel—Carl-load lots in boiler room, $3.90.

Arcs on Underground Circuits—In the City of Providence 272 arc lamps are served by underground wires and 1,802 are served by overhead wires. The cost per annum is the same for each kind of service, namely, $109.50 per lamp per annum. The cost of a 32-candle power incandescent lamp burning all night is $24 per lamp per year.

Distance between the arc lamps varies from 150 to 400 feet apart.

All the equipment used for electric lighting is owned by the companies supplying current.

Rates for Maintenance of Gas Lamps—Apparently the only gas lamps used by the City of Providence are 793 Welsbach gas lamps burning all night at a cost of $30 per year per lamp.

Cost Per Kilowatt Hour for Electric Service used in Public Buildings.

Electric current is furnished the city of Providence at 6 cents per kilowatt hour, as measured by the meters, with no further adjustment or discount for long or short hours of burning.

Cost of Subway Construction—No reliable information in regard to the cost of subway construction could be obtained.

The preceding notes show the cities from which fairly complete data was obtained. We have the returns for several cities not complete but still available for purposes of comparison of the cost of arc lamps. I would quote same briefly:

LOUISVILLE, KY.—

Uses 1,758 2,000 candle-power lamps, burning all night and every night, and pays for same at the rate of $84 per arc light per annum.

Term of Contract—Four years.

Electric current is sold to the City of Louisville for lighting public buildings at the rate of 16 cents per kilowatt hour, with 30 per cent. discount if paid within fifteen days.

The cost of coal is about $2 per ton, and the rate for gas for the use in public buildings is $1 per thousand cubic feet. No gas is used for lighting streets.

LOS ANGELES, CAL.—

Uses 1,050 2,000-candle power arc lights, burning all night and every night, and pays for same at the rate of $81 per lamp per year.

Term of Contract—One year.

No electric current is used for lighting public buildings.

Coal costs $8 per ton, and the Los Angeles Electric Company states that it uses oil for fuel. The Pacific Light and Power Company states that it uses oil for fuel, oil costing from fifty to sixty-five cents per barrel.

Gas for use in public buildings is $1 per thousand cubic feet.

No gas is used for lighting streets.

MILWAUKEE, WIS.—

Uses 1,812 2,000-candle power electric arc lights, burning all night and every night, of which 1,612 are on overhead service and 200 are on underground service. The price paid respectively per year is $81 each for lights fed from overhead circuits, and $99 per year each for lights fed from underground circuits. The Electric Light Company reports that all its lines and circuits are required to be underground, and are underground for a radius of two miles from the centre of the city.

Electric current is sold for lighting in public buildings in Milwaukee at rates running from four to ten cents, depending on quantity used.

Term of contract five years.

Coal costs about $3.50 a ton.

The rate of gas for use in public buildings per thousand cubic feet is 80 cents.

Milwaukee also uses 2,500 Welsbach mantle lamps of 60-candle power each, at $28 per lamp per year, and 512 Welsbach naphtha lamps, at $24.37 per year.

PITTSBURG, PA.—

Uses 2,835 arc lamps, burning all night and every night, at the rate of $96 per year per lamp.

The term of the city contract is one year. The city uses 3,364 gasolene lamps, at $19.37 per year.

NEWARK, N. J.—

Uses 1,950 2,000 candle power arc lamps, of which 200 are served by underground wires and 1,750 are served by overhead wires. The cost for these lamps, whether underground or overhead, is $95 per year per light. Each lamp burns 4,000 hours per year, and the energy required by contract for each lamp is 450 watts between the carbons.

The term of contract is five years.

Both open and enclosed and both alternating and direct current lamps are used.

Cost of coal about $2.75 per ton.

JERSEY CITY, N. J.—

Uses 1,402 arc lamps, served by overhead wires, at a cost of $97.50 per lamp per year. The lamps used are direct open series, the lamps burning 3,983 hours, and consuming 450 watts of energy between carbons.

The term of contract is five years.

The price of coal is about $2.75 per ton.

EXHIBIT "E."

List of Employees of Bureau of Lamps and Gas, 1903, and Street Sign Lamps.

List of Employees of Bureau of Lamps and Gas, 1903.

1	Engineer of Surface Construction, per annum	$3,000 00
1	Clerk, per annum	1,500 00
1	Stenographer and Typewritist, per annum	1,050 00
1	Stenographer and Typewritist, per annum	900 00
1	Junior Clerk, per annum	600 00
1	Draughtsman, per annum	900 00
1	Inspector of Lamps and Gas, per annum	1,350 00
3	Inspectors of Lamps and Gas, per annum	1,200 00
18	Inspectors of Lamps and Gas, per annum	1,000 00
4	Lighters of Markets, per month	10 00
1	Lighter of Markets, per month	20 00
1	Cleaner of Storehouse, per month	10 00
1	Locomobile Engineer, per day	2 50

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Street Sign Lamps.

During the year there have been relighted 1,083 gas lamps as street sign lamps. Owing to the fact that these lamps had been disused for a number of years, repairs were necessary before they could be so relighted. The estimated expenses for the lighting of these lamps for the year 1903 at the prices charged by the gas companies for lighting in 1902 is $9,676.93, and for necessary repairs, $4,226.50, making an approximate total of $13,903.43. This must be paid out of the "Revenue Bond Fund for the Construction, Erection and Maintenance of Street Signs." This Bureau has audited bills of the New York Edison Company for May, June, July, August, September, October and November for lighting 144 rectangular electric street sign boxes at $12.50 per box per year, aggregating $1,050.

Gas street sign lamps	1,083
Electric street sign lamps	144
Total	1,227

EXHIBIT "F."

Test of Gas Arc Lamps in Armory of Squadron "A" and Twelfth Regiment Armory.

Office of the Engineer of Surface Construction,
New York, December 4, 1903.

Hon. ROBERT GRIER MONROE, Commissioner:

Dear Sir—Having just received the meter readings for the consumption of gas for November, I beg herewith to report in regard to the test we are conducting as to the saving in consumption of gas in certain armories.

Early last Summer we determined to make a test of the Scott Snell gas lamp for lighting and economy in consumption of gas. We placed ten (10) lamps in the drill hall of the Armory of Squadron "A" and eighteen (18) in the drill hall of the Armory of the Twelfth Regiment, first obtaining permission of the Armory Board and commanding officers of these regiments. Owing to the delays in manufacture, and so on, these lamps were not ready for test, as we expected, by the 1st of August, and it was October 1 before the test was started in Squadron "A" and about October 12 before it was started in the Twelfth Regiment.

The Scott Snell lamp is a mantle gas lamp, burning gas in conjunction with hot air under pressure, the power for pumping the hot air being created by the heat of the lamp itself. Each lamp consumes about 15 c. f. of gas per hour. It gives a clear intense white light of about 600 c. p., somewhat similar to the light given by an enclosed electric arc lamp.

The armories were lighted before we began the test, by coronas and rows of gas lamps with open flame burners. The Twelfth Regiment Armory had eighteen (18) of thse coronas, with 32 gas jets each; Squadron "A" had a single chandelier containing eight of them, with 24 gas jets each, and two lines of pipe with 200 gas jets each, set very close together, extending entirely across each end of the Drill Hall.

The normal consumption of gas for the year ending September 30, 1903, in each armory, was as follows:

Squadron "A," cubic feet	2,594,200
Twelfth Regiment, cubic feet	3,617,200
Total of cubic feet	6,211,400

Of this consumption, as nearly as I can estimate, the drill halls consume about 3,500,000 cubic feet of gas per annum.

These drill halls are used eight months in the year, principally beginning in September and ending in May, so that there are practically eight lighting months of heavy use. In the remaining four months of midsummer the consumption is comparatively small.

The comparative consumption of gas in these drill halls during the months of October and November just passed, as compared with the corresponding months of 1902, are as follows:

	Cubic Feet.
Squadron "A," consumption of entire building, October, 1902	267,400
Squadron "A," consumption of entire building, October, 1903	162,200
Net saving in 1903 over 1902	105,200
Squadron "A," consumption of entire building, November, 1902	306,000
Squadron "A," consumption of entire building, November, 1903	223,400
Net saving in 1903 over 1902	82,600
Total saving for two months	187,800
Twelfth Regiment, consumption of entire building, October, 1902	311,000
Twelfth Regiment, consumption of entire building, October, 1903	212,000
Net saving in 1903 over 1902	99,000
Twelfth Regiment, consumption of entire building, November, 1902	412,600
Twelfth Regiment, consumption of entire building, November, 1903	254,300
Net saving for 1903 over 1902	158,300
Total saving for seven weeks	257,300
Total saving for two months in Squadron "A," and seven weeks in Twelfth Regiment	445,100

If this proportion holds good throughout the eight months, the net saving for the year 1903 over 1902 would be at least 1,927,428 cubic feet.

The variations of the consumption of Squadron "A" is caused by the fact that they do not like to change from the yellow to the white light, and consequently quite unnecessarily at times, they have lighted up the central chandelier under the old system during November. Even against this a large saving is shown.

In the Twelfth Regiment the difference between the two is caused by the fact that the test did not begin there until about the 12th of October, and that the hours of burning were greater in November than in October.

The saving in both of these armories could be largely increased by equipping them properly with more economical and efficient burners on the brackets in the drill halls and in the halls of the building and company rooms. This is shown in the main drill hall of the Twelfth Regiment, where three mantle burners on each of the one set of brackets give more light than the seven open-flame gas jets on each bracket in the opposite set. The gas consumption for the mantle lights is about 10 cubic feet per hour per bracket, and for the open-flame lights of about 30 cubic feet per hour per bracket.

As I have stated before, in my opinion both of these armories have sufficient light.

At the Squadron "A" Armory I think a couple of more lights could be put in without being excessive, as tan bark absorbs a very large amount of white light and does not absorb so readily the old yellow light which was formerly used.

At this armory they wish electric arc lights, which would give almost the same results as the present gas lamps, the arc light being also a white light, but considerably more expensive.

The result of this test shows such a large saving in consumption that it proves that there is a most fruitful field for economy in the use of gas by proper appliances in public buildings. Several of our larger armories are lighted entirely by gas in the same way as the two armories we have experimented upon, and no doubt an equivalent saving could be made.

If you wish the test continued further, I will be glad to do so and report again, but even under the adverse circumstances we have met in making this test, the sav-

ing is so large that it seems impossible to have any doubt of the continued effect of same.

I am, very respectfully,
(Signed) C. F. LACOMBE,
Engineer of Surface Construction.

EXHIBIT "G."

Office of the Engineer of Surface Construction,
New York, December 31, 1903.

Mr. C. F. LACOMBE, Engineer of Surface Construction:

Dear Sir—Pursuant to your instructions, I herewith submit tables and data, showing work done, changes in lighting, new streets lighted, etc., during the year 1903.

Form No. 1 shows the number of lamps burning January 1, 1903, number of new lamps lighted, old lamps relighted, lamps discontinued, total number of lamps burning December 31, 1903, and the average number of lamps burning throughout the year.

The 2,039 arc lamps lighted by the New York Edison Company of Manhattan, includes twenty-three (23) free lamps, one (1) temporary lamp on account of Rapid Transit construction work and seventeen on Williamsburg Bridge.

The eight hundred and eighty-three (883) lamps lighted by the Brush Electric Illuminating Company, include four (4) lamps on East Twenty-fourth street pier, which are lighted until 12 p. m. only, on account of the schoolship "St. Mary's," and one lamp at Police Headquarters and one (1) lamp at Engine Company 20, on Mercer street.

The thirteen thousand four hundred and thirteen (13,413) lamps lighted by the Consolidated Gas Company include five thousand and sixty-two (5,062) single Welsbach and sixteen (16) double Welsbach lamps. Provision has been made for discontinuing the latter and replacing them with electric lamps.

The seven hundred and fifty-six (756) Welsbach naphtha lamps lighted by the Welsbach Street Lighting Company in Manhattan includes two bracket lamps at the Casino, Central Park, which are charged for at $18 per year.

The one thousand and fifty-three (1,053) arc lamps lighted by the New York Edison Company, Bronx, include one (1) free lamp and two (2) on Central Bridge.

Form No. 2 shows the number of gas and electric street sign lamps lighted and number discontinued during the year and the total number burning December 31, 1903.

Form No. 3 shows the number of new lamp-posts fitted up, posts removed and reset and repairs to posts during year.

Form No. 4 shows the number of outages deducted for and amount deducted from bills for same for all companies for each month, electric, gas and naphtha, and total for year for Manhattan and The Bronx. Also same for street sign lamps.

Form No. 5 shows streets newly lighted and streets on which the lighting system has been changed during 1903, and streets for which provision has been made to change the lighting in Manhattan and The Bronx.

Form No. 6 shows mileage of additional streets lighted and discontinued during the year and total mileage of streets lighted by electric, gas and naphtha lamps, December 31, 1903.

Form No. 7 shows schedule for lighting and extinguishing public gas lamps in Manhattan and The Bronx for the year 1904.

Form No. 8 shows the length of new mains laid, old mains abandoned, old mains taken up and total length of mains in use December 31, 1903, for each gas company in Manhattan and The Bronx, and total for both boroughs.

In regard to breakage of glass in public street lamps, the several gas companies have reported as follows:

Glass Broken on Public Street Lamps in 1903.

	Lights of Glass in Square Lanterns.	Minor Globes.	Boulevard Globes.
Consolidated	67,755	4	706
New Amsterdam	24,430	2	226
Standard	14,869	..	388
Central Union	13,017	..	100
Northern Union	22,889	50	250
Westchester	1,150	110	...
Total	144,110	166	1,670

The first three companies maintain gas lamps in Manhattan and the last three in The Bronx.

The electric light companies also report excessive breakage of globes.

This breakage is mostly attributed to the small boy with the stone, but this complaint is hardly borne out by the report of the Westchester Lighting Company, which is to the effect that five hundred and eighty-seven (587) inner globes and only sixty-five (65) outer globes were broken on the public street lamps maintained by that company.

Respectfully submitted,
WM. G. QUIRK, General Inspector.

Following table shows number of new electric, gas and naphtha lamps lighted, lamps relighted, lamps discontinued, total number of lamps burning December 31, 1903, and average number of lamps burning during year for Manhattan.

MANHATTAN.

COMPANY.	No. of Lamps Jan. 1, 1903.	New Lamps Lighted.	Lamps Re-lighted.	Lamps Discontinued.	Total No. of Lamps Dec. 31, 1903.	Average No. of Lamps Lighted During Year.
Electric.						
New York Edison—						
Incandescent	44	14	....	2	56	50
Arc	1,078	62	....	1	2,039	1,986
Brush	884	7	....	8	883	882
United Electric Light and Power Company	18	....	....	....	18	18
Total Electric—						
Incandescent	44	14	....	2	56	50
Arc	2,880	69	....	9	2,940	2,863
Gas.						
*Consolidated	13,582	91	1,428	1,688	13,413	13,505
New Amsterdam	2,962	5	35	60	2,962	2,976
Standard	1,585	....	20	34	1,571	1,573
Total Gas	18,149	96	1,483	1,782	17,946	18,054
Naphtha.						
New York and New Jersey Globe	107	....	....	....	107	107
Welsbach Street Lighting Company	756	9	....	9	756	759
Total Naphtha	863	9	....	9	863	866
Total Manhattan	21,936	188	1,483	1,802	21,805	21,833

COMPANY.	No. of Lamps Jan. 1, 1903	New Lamps Lighted.	Lamps Re-lighted.	Lamps Discontinued.	Total No. of Lamps Dec. 31, 1903.	Average No. of Lamps Lighted During Year.
*Ordinary	8,854	55	337	911	8,335	8,514
*Single Welsbach	4,138	36	1,056	168	5,062	4,695
*Double Welsbach	590	....	35	609	16	296
Total	13,582	91	1,428	1,688	13,413	13,505

Following table shows number of new electric, gas and naphtha lamps lighted, lamps relighted, lamps discontinued, total number of lamps burning December 31st, 1903, and average number of lamps burning during year for The Bronx:

THE BRONX.

COMPANY.	No. of Lamps, Jan. 1, 1903.	New Lamps Lighted.	Lamps Re-lighted.	Lamps Discontinued.	Total No. of Lamps, Dec. 31, 1903.	Average No. of Lamps Lighted During Year.
Electric.						
New York Edison—						
Incandescent	351	2	....	.....	356	354
Arc	1,022	40	.....	9	1,053	1,009
Bronx Gas and Electric	650	1	....	.....	651	651
Westchester Lighting Company—						
Incandescent	24	.....	.....	.....	24	24
Arc	227	.....	.....	.....	227	227
Total—						
Incandescent	378	2	.....	.....	380	378
Arc	1,899	41	.....	9	1,931	1,917
Gas.						
Central Union	2,020	46	7	99	1,974	1,972
Northern Union	3,226	98	88	81	3,331	3,298
Westchester Lighting Company	360	.....	7	24	343	343
Total gas	5,606	144	102	204	5,648	5,623
Naphtha.						
New York and New Jersey Globe	1,367	25	.....	60	1,332	1,333
Welsbach Street Lighting Company	99	9	.....	8	100	95
Total Naphtha	1,466	34	.....	68	1,432	1,428
Total The Bronx	9,349	221	102	281	9,791	9,746
Grand Total—Manhattan and The Bronx	31,285	409	1,585	2,083	31,196	31,179

The following table shows number of gas and electric street signs lighted and discontinued during year 1903, and total number burning December 31, 1903.

MANHATTAN.

COMPANY.	Street Sign Lamps Lighted.	Street Sign Lamps Discontinued.	Total Street Sign Lamps Burning Dec 31, 1903.
Gas.			
Consolidated	487	24	463
New Amsterdam	447	7	440
Standard	184	4	180
Total gas	1,118	35	1,083
Electric.			
New York Edison	144	.....	144
Total gas and electric	1,262	35	1,227

The following table shows the number of gas lamp-posts fitted up, removed, reset and repairs made to posts during the year 1903.

Manhattan.

COMPANY.	New lamp-posts fitted up.	Lamp-posts removed.	Lamp-posts reset.	Lamp-posts straightened.	Columns refitted.	Columns releaded.	Columns recaulked.	Service pipes refitted.	Standpipes refitted.
Consolidated	102	268	434	727	55	631	68	184	168
Standard	..	22	28	116	9	112	72	17	29
New Amsterdam	5	36	184	253	35	280	85	134	170
Total Manhattan	107	326	646	1,096	99	1,043	245	335	376

The Bronx.

COMPANY.	New lamp-posts fitted up.	Lamp-posts removed.	Lamp-posts reset.	Lamp-posts straightened.	Columns refitted.	Columns releaded.	Columns recaulked.	Service pipes refitted.	Standpipes refitted.
Northern Union	82	249	295	158	2	117	24	35	..
Central Union	10	29	88	84	2	57	1	11	1
Westchester Lighting Company	..	8	4	13	..	4	..	1	..
Total Bronx	92	306	387	255	4	178	25	47	1
Total Manhattan and The Bronx	199	632	1,033	1,351	103	1,221	270	402	377

The following table shows the number of outages and the amount deducted for same for electric, gas and naphtha lamps in Manhattan and The Bronx for year ending December 31, 1903:

	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.	No. extinguished.	Amount deducted.
MANHATTAN.																								
Electric	1,831	$127 76	1,516	$93 71	1,027	$54 58	714	$53 53	789	$45 00	818	$55 18	505	$62 44	760	$46 63	881	$58 64	1,047	$70 73	862	$60 31	755	$64 59
Gas	2,835	133 68	1,124	54 11	1,038	49 68	1,326	60 85	1,193	70 30	2,451	125 85	1,600	86 77	1,7 7	90 91	1,792	83 12	2,922	134 54	3,433	165 53	3,328	2 3 85
Naphtha	....	....	6	50	....	....	....	....	....	....	....	....	....	....	....	....	....	....	30	2 47	....	....	10	82
Total, Manhattan	4,663	$261 44	2,646	$153 32	2,065	$104 26	2 040	$114 38	2,282	$115 30	3,269	$181 03	2,505	$149 21	2,547	$137 54	2,673	$141 66	3,999	$207 74	4,295	$225 84	4,093	$289 26
THE BRONX.																								
Electric	1,252	$179 44	1,193	$108 56	516	$64 49	1,146	$96 99	280	$45 07	1,256	$60 73	584	$85 93	218	$41 86	1,231	$119 69	1,598	$141 33	166	$31 45	196	$30 84
Gas	30	19 49	72	4 53	99	6 16	2 8	13 7	47	3 02	31	1 67	45	2 83	46	2 92	152	9 83	508	31 37	116	7 42	217	13 93
Naphtha	....	....	....	....	....	....	7	49	26	1 84	1	03	....	....	1	09	2	12	3	18	10	60	27	2 22
Total, The Bronx	1,560	$ 98 93	1,265	$114 09	615	$70 65	1,361	$110 75	353	$49 93	1,288	$62 78	629	$88 81	265	$44 77	1,385	$129 64	2,109	$172 88	292	$39 47	440	$46 99
Total, Manhattan and The Bronx	6,226	$460 37	3,911	$266 41	2,680	$175 91	3,401	$225 13	2,635	$165 23	4,557	$243 81	3,134	$238 02	2,812	$182 31	4,058	$271 30	6,108	$ 80 62	4,587	$265 31	4,533	$336 25
MANHATTAN.																								
Street Signs, Gas	....	....	....	....	....	....	....	....	....	....	65	$3 01	217	$9 24	159	$6 95	98	$4 46	297	$13 40	275	$11 70	538	$22 43

	EXTINGUISHMENTS.	AMOUNT DEDUCTED.
Total for year for electric, gas and naphtha lamps in Manhattan and The Bronx	48,642	$3,210 67
Total for year for street signs in Manhattan	1,049	71 19
Grand total for year	50,291	$3,281 85

Respectfully submitted,
C. F. LACOMBE. Engineer of Surface Construction.

The following streets, etc., were lighted during the year 1903:

MANHATTAN.

Electric—
Park avenue, Forty-first to Forty-second street.
Elm street, Centre street to Astor place.
Frankfort street, northeast corner Park Row.
North William street, north of Frankfort street.
William street, north of Frankfort street.
Vandewater street, north of Frankfort street.
Cliff street, corner Hague street.
Dover street, corner Cherry street.
Dover street, corner Water street.
Clinton street, corner Delancey street.
Clinton street, south of Delancey street.
Great Jones street and Jones alley.
Seventh avenue, One Hundredth and Tenth street to One Hundred and Twenty-first street.

Besides Which—
The Manhattan approach to Central Bridge has been lighted with 1 arc lamp.
The Isle of Safety at Twenty-third street and Fifth avenue has been lighted with 1 arc lamp and 4 incandescent lamps.
The New Williamsburg Bridge from the Manhattan end to centre of span has been lighted with 17 arc lamps.
Six incandescent electric lamps have been placed in front of the home of Mayor Seth Low.
Two free public baths are lighted by electric arc lamps during the summer.
East Twenty-fourth Street Pier is lighted with 4 arc lamps about six months each year on account of the schoolship "St. Mary's."

Ordinary Gas—
One Hundred and Fifty-fifth street, Seventh avenue to Eighth avenue.
Fifth avenue, One Hundred and Thirty-seventh street to One Hundred and Fortieth street.
One Hundred and Fortieth street, Amsterdam avenue to Convent avenue.
One Hundred and Eightieth street, Amsterdam avenue to Broadway.
One Hundred and Seventy-ninth street, Audubon avenue (northeast and southwest corners).
Ninety-ninth street, West End avenue to Riverside drive.
Kingsbridge avenue, Terrace View avenue to Spuyten Duyvil Creek.
Sullivan street, Third street to Washington Square South.

Besides Which—
Six churches and 1 church club have been provided with ordinary gas lamps.

Single Welsbach Gas—
One Hundred and Thirtieth street, between Third and Lexington avenues.
Edgecombe avenue, east of Amsterdam avenue.
Two Hundred and Ninth street, Tenth avenue to Harlem River.
Isham street, Tenth avenue to Broadway.

Single Welsbach Gas, Formerly Lighted by Ordinary Gas Lamps—
Public square, junction One Hundred and Twenty-fifth street, Manhattan street, Hancock place and Columbus avenue.
Theatre alley, between Ann and Beekman streets.
Fifty-third street, Eighth and Ninth avenues.
Seventy-ninth street, between Columbus and Amsterdam avenues.
Seventy-first street, Columbus avenue and Central Park West.
Amsterdam avenue, One Hundred and Twenty-fifth street to One Hundred and Ninety-sixth street.
Hamilton place, One Hundred and Forty-third street to One Hundred and Forty-fourth street.
St. Nicholas avenue, One Hundred and Sixty-first street and One Hundred and Sixty-second street.
Road in Fort Washington Park.
Roosevelt street, northwest corner Front street.
Frankfort street, Rose street to William street.

Besides Which—
Nine churches have been provided with single Welsbach gas lamps.

Single Welsbach Gas, Formerly Lighted by Double Welsbach Gas Lamps—
Broadway, Fifty-ninth to One Hundred and Twenty-fifth street.
Amsterdam avenue, Sixty-ninth to One Hundred and Twenty-fifth street.
Sixty-third street, First avenue to East River.
Seventy-sixth street, Avenue A to East River.
Grand Circle, junction Fifty-ninth street and Eighth avenue.

Single Welsbach Gas, Formerly Lighted By Ordinary Gas Lamps and Charged for As Ordinary Gas Lamps to January 1, 1904—
Seventeenth street, Fourth avenue to Broadway.
Twentieth street, Fourth avenue to Broadway.
Nineteenth street, Fourth avenue to Broadway.
Twenty-first street, Fourth avenue to Broadway.
Tenth avenue, Little West Twelfth street to Forty-second street.
Seventy-fourth street, Central Park West to Columbus avenue.
Sixty-sixth street, Park to Madison avenue.
Ninety-sixth street, Broadway to Hudson River.

Single Welsbach Gas, Formerly Lighted By Ordinary Gas Lamps and Charged for As Ordinary Gas Lamps to January 1, 1904—
Fort Washington avenue, corner One Hundred and Eighty-first street.
Clinton street, Broome street to Rivington street.
Attorney street, southeast corner Rivington street.
Ridge street, Broome street to Rivington street.
Pitt street, Broome street to Rivington street.
Delancey street, Attorney street to Pitt street.
Twenty-sixth street, Second avenue to East River.
Forty-eighth street, Fifth avenue to Sixth avenue.
Rivington street, Bowery to Pitt street.
Pike street, Henry street to East Broadway.
William street, Pearl street to Duane street.
Pearl street, Park row to Madison street.
Madison street, Pearl street to Roosevelt street.
Cherry street, Franklin square to Roosevelt street.
Oak street, Pearl street to Roosevelt street.
Water street, Roosevelt street to Fulton street.
Hague street, Cliff street to Pearl street.
Front street, Roosevelt street to Dover street.
Jacob street, south of Frankfort street.
Twelfth avenue, Manhattan street to One Hundred and Thirty-fourth street.
Fifty-first street, Eighth avenue to North River.
West End avenue, Seventy-first street to Seventy-second street.
Twenty-fifth street, Seventh avenue to Tenth avenue.

Besides Which—
Three churches have been provided with single Welsbach gas lamps under these conditions.

BRONX.

Electric—
Central Bridge, draw span and approach.
Avenue C and Second street, Unionport.
Road (Two Hundred and Forty-second street), Van Cortlandt Park.
Shelter Houses, Central Bridge.
Van Cortlandt lake, Van Cortlandt Park.
The lamps around Van Cortlandt lake in Van Cortlandt Park are lighted only during the winter months for the benefit of skaters.

Ordinary Gas—
Trafalgar place, One Hundred and Seventy-fifth street to One Hundred and Seventy-sixth street.
Hughes avenue, Tremont avenue to One Hundred and Eighty-first street.
One Hundred and Ninety-seventh street, Bainbridge to Decatur avenue.
Belmont place, Third avenue to Hoffman street.
Arthur avenue, West 1 South One Hundred and Eightieth street.
Park avenue, One Hundred and Eighty-first street to One Hundred and Eighty-second street.
One Hundred and Seventy-eighth street, Vyse and Daly avenues.
Tremont avenue, Jerome to Walton avenue.
Becker avenue, at railroad bridge.
One Hundred and Seventy-fifth street, northwest corner Southern Boulevard.
Prospect avenue, Boston road to Crotona Park East.
Jackson avenue, One Hundred and Sixty-sixth street to 250 feet north of One Hundred and Sixty-sixth street.
One Hundred and Eightieth street, Lafontaine avenue to Arthur avenue.
One Hundred and Eightieth street, Belmont avenue to Clinton avenue.
One Hundred and Eightieth street, Southern Boulevard to Mohegan avenue.
One Hundred and Fifty-third street, Viaduct over New York and Harlem railroad tracks.
Anthony avenue, One Hundred and Eightieth street to One Hundred and Eighty-second street.
Besides which two churches have been provided with gas lamps.

Ordinary Gas, formerly Lighted by Naphtha Lamps—
Briggs avenue, White Plains road to Fifth avenue.
North Oak drive, Bronxwood Park.
South Oak drive, Bronxwood Park.
Locust avenue, Bronxwood Park.
Elm avenue, Bronxwood Park.
Rosewood avenue, Bronxwood Park.
Bartholdi street, Bronxwood Park.
Fifth avenue, northwest corner Fifth street, Williamsbridge.
Fourth avenue, Briggs avenue to Eighth street, Williamsbridge.
Seventh street, White Plains road to Fourth avenue.
Besides which
Three churches have been provided with gas lamps in place of naphtha lamps.

Ordinary Naphtha—
One Hundred and Seventy-eighth street, Bryant avenue and Boston road.
Vernon Parkway North, between Vernon Parkway and Osman place.
Two Hundred and Thirty-fourth street, between Verio avenue and Webster avenue.
Nineteenth avenue, Jefferson avenue to Fox avenue.
Indian Pond, Crotona Park.
The lamps around Indian Pond, in Crotona Park, are lighted only in the winter, for the benefit of skaters.

Welsbach Naphtha—
One Hundred and Ninety-second street, Creston to Jerome avenue.
Washington street, Unionport road and Columbus avenue.
Besides which
The entrance of one church has been lighted with naphtha lamps.
Provision has been made for lighting the following streets, but same has not yet been done:

MANHATTAN.

Electric—
Seventh avenue, One Hundred and Thirty-fourth street to One Hundred and Fifty-fifth street.
Eleventh avenue, Twenty-fourth street to Fifty-ninth street.
West End avenue, Fifty-ninth street to Seventy-first street.
Twelfth avenue, Twenty-fourth street to Fifty-seventh street.
Sixty-sixth street, Eleventh avenue to New York Central and Hudson River railroad tracks.
Fifty-seventh street, Eleventh avenue to Twelfth avenue.
Longacre square, Forty-third street to Forty-seventh street.

Ordinary Gas—
Van Corlear place, east and west of Jacobus place.
Academy street, southeast corner Seaman street.

Single Welsbach Gas—
Unnamed street, Clinton street to East river.
One Hundred and Twenty-ninth street, Third avenue to Fifth avenue.
One Hundred and Fifty-second street, St. Nicholas place to Broadway.
One Hundred and Fifty-third street, St. Nicholas place to Broadway.
St. Nicholas avenue, One Hundred and Twelfth street to One Hundred and Fifty-fifth street.
St. Nicholas place, One Hundred and Fiftieth street to One Hundred and Fifty-fifth street.
Ninety-sixth street, under Riverside Drive Viaduct.
Besides which provision has been made for lighting the entrance to one (1) church with single Welsbach gas lamp.

Welsbach Naphtha—
One Hundred and Eighty-first street, Broadway to Lafayette Boulevard.
Northern avenue, One Hundred and Eighty-first street to end.

BRONX.

Electric—
West Farms road, Home street to One Hundred and Seventy-second street.
Webster avenue, Gunhill road to City line.
Two Hundred and Thirty-fourth street, Kingsbridge road to Corlear avenue.

Ordinary Gas—
Sherman avenue, One Hundred and Sixty-second to One Hundred and Sixty-third street.
Elm place, Kingsbridge road to One Hundred and Eighty-ninth street.
Emmet street, north of Pelham avenue.
Mohegan avenue, One Hundred and Eightieth street to One Hundred and Eighty-first street.
Davidson avenue, south of Fordham road.
Aqueduct avenue east, One Hundred and Eighty-second street to Buchanan street.
Morris avenue, One Hundred and Seventy-ninth street to One Hundred and Eighty-first street.
Andrews avenue, One Hundred and Eighty-third street to Fordham road.
Bainbridge avenue, Kingsbridge road to One Hundred and Ninety-sixth street.
Bryant street, Old Ward line to north of One Hundred and Seventy-second street.
Catherine street, Twentieth street to City line.
One Hundred and Seventy-second street, Vyse to West Farms road.
Crotona avenue, One Hundred and Eighty-first street to One Hundred and Eighty-seventh street.
Fourth avenue, Eighth street to Fifteenth street.
One Hundred and Sixty-fifth street, Clay avenue to Webster avenue.
Besides which provision has been made for one (1) church.

Ordinary Naphtha—
One Hundred and Thirty-second street, Willow avenue to Bronx kills.
Bronx River place, north of Becker avenue.
Germain place, Ray street to One Hundred and Fifty-ninth street.
Brook avenue, One Hundred and Fifty-ninth street to Third avenue.
Third street, east of Sixth avenue, Williamsbridge.
New path in Bronx Park.
Old West Farms road, west of Morris Park avenue.

Welsbach Naphtha—
Summit avenue, One hundred and Sixty-first street to One hundred and Sixty-sixth street.
Bronx and Pelham parkway, Baychester avenue to Eastern Boulevard.
New Road in Bronx Park.
Jackson avenue, Garfield street to Unionport road.
Harrison avenue, Westchester avenue to Cornell avenue.
Saxe avenue, Westchester avenue to McGraw avenue.
Old road, Saxe avenue to Cottage Grove avenue.
Unnamed street, north of McGraw avenue.
Lafayette street, Railroad avenue to Grace avenue.
Globe avenue, Doris avenue to Greene avenue.
Grace avenue, Lyon avenue to Rose place.
Parker avenue, Lyon avenue to Rose place.
Rose place, Grace avenue to Parker avenue.
St. Raymonds avenue, Lafayette avenue to Greene avenue.
Carroll place, Greene avenue to Washington street.
Fourth street, east of Greene avenue.
Shore road, Eastern Boulevard to City Island road, Pelham Bay Park.
Shore road, City Island road to City Island Bridge, Pelham Bay Park.
Shore road, Eastern Boulevard to Waterbury lane, Pelham Bay Park.
Prospect Hill road, Eastern Boulevard to City line.
Besides which provision has been made for lighting the entrance to one church with Welsbach naphtha lamp.

The following table shows the mileage of streets lighted by electric, gas and naphtha lamps in Manhattan and The Bronx:

	Arc Electric.	Incandescent Electric.	Ordinary Gas.	Welsbach Gas.	Ordinary Naphtha.	Welsbach Naphtha.	Total.
Manhattan—	1580		410	1075	3700	4220	425
January 1, 1903.....	140 5280	.....	219 5280	67 5280	5280	5280	428 5280
	3752		4372	4443			2007
Additional during 1903..	2 5280	.....	5280	10 5280	.....	.....	14 5280
			4693				4693
Deductions during 1903.	.....	.....	12 5280	.....	.....	.....	12 5280
	52		89	238	3700	4220	3019
December 31, 1903.....	143 5280	.....	207 5280	78 5280	5280	5280	429 5280
Bronx—	3010	2100	4645		5060	390	4645
January 1, 1903.....	124 5280	10 5280	113 5280	.....	34 5280	2 5280	285 5280
	4760		1428		1805	1025	3738
Additional during 1903..	5280	.....	3 5280	.....	5280	5280	4 5280
			3860		4606		3186
Deductions during 1903.	.....	.....	5280	.....	1 5280	.....	2 5280
	2490	2100	2213		2259	1415	5197
December 31, 1903.....	125 5280	10 5280	116 5280	.....	33 5280	2 5280	287 5280
Total Manhattan and The Bronx, December 31, 1903	2542 268 5280	2100 10 5280	2302 323 5280	238 78 5280	679 34 5280	355 3 5280	2936 717 5280

Time Table for Lighting and Extinguishing the Public Gas Lamps for the Year 1903.

Months.	Date.	Begin to Light.	Begin to Extinguish.
		h. m.	h. m.
January	1 to 7	4.20	6.20
January	8 to 14	4.35	6.25
January	15 to 21	4.50	6.25
January	22 to 28	5.00	6.25
January	29 to Feb. 4	5.05	6.15
February	5 to 11	5.10	6.10
February	12 to 18	5.20	5.55
February	19 to 25	5.30	5.55
February	26 to Mar. 4	5.30	5.45
March	5 to 11	5.40	5.35
March	12 to 18	5.50	5.20
March	19 to 25	6.00	5.10
March	26 to April 1	6.10	4.55
April	2 to 8	6.15	4.40
April	9 to 15	6.25	4.30
April	16 to 22	6.30	4.20
April	23 to 29	6.40	4.10
April	30	6.45	4.00
May	1 to 6	6.45	4.00
May	7 to 13	6.55	3.40
May	14 to 20	7.00	3.30
May	21 to 27	7.10	3.15
May	28 to June 3	7.15	3.15
June	4 to 10	7.25	3.15
June	11 to 17	7.25	3.15
June	18 to 24	7.30	3.15
June	25 to July 1	7.30	3.15
July	2 to 8	7.30	3.15
July	9 to 15	7.30	3.15
July	16 to 22	7.20	3.15
July	23 to 29	7.20	3.15
July	30 to Aug. 5	7.10	3.30
August	6 to 12	7.10	3.45
August	13 to 19	6.55	4.00
August	20 to 26	6.45	4.10
August	27 to Sept. 2	6.30	4.20
September	3 to 9	6.15	4.30
September	10 to 16	6.05	4.40
September	17 to 23	5.55	4.50
September	24 to 30	5.40	5.00
October	1 to 7	5.30	5.00
October	8 to 14	5.20	5.10
October	15 to 21	5.10	5.20
October	22 to 28	5.00	5.30
October	29 to Nov. 4	4.45	5.35
November	5 to 11	4.25	5.55
November	12 to 18	4.15	6.10
November	19 to 25	4.00	6.00
November	26 to Dec. 2	4.00	6.00
December	3 to 9	4.00	6.05
December	10 to 16	4.00	6.05
December	17 to 23	4.00	6.05
December	24 to 31	4.10	6.15
	Total.....		4,000 hours.

Department of Water Supply, Gas and Electricity,
New York, December 31, 1902.

The above table will show the time for lighting and extinguishing the public lamps during the year 1903. All the lamps to be lighted within one hour from the time of beginning.

ROBERT GRIER MONROE,
Commissioner of Water Supply, Gas and Electricity.

The following table shows the number of miles of mains laid, disused and taken up during the year 1903, and total number of miles in use on December 31, 1903:

Company.	Number of Feet of Old Mains Abandoned.	Number of Feet of New Mains Laid.	Number of Feet of Old Mains Abandoned.	Number of Feet of Old Mains Taken Up.	Total Number of Feet of Mains in Use.
Manhattan—	2883	2579	3426	553	1483
Consolidated	867 5280	9 5280	12 5280	6 5280	858 5280
	3555		3476	588	4771
New Amsterdam	255 5280	.....	1 5280	1 5280	252 5280
	4372		145		4227
Standard	199 5280	.....	5280	.....	199 5280
	250	2579	1767	1141	5201
Total Manhattan.....	1323 5280	9 5280	14 5280	7 5280	1310 5280
Bronx—	4804	2249			1773
Consolidated	2 5280	17 5280	.....	.....	20 5280
	4519				4519
Central Union	101 5280	.....	.....	.....	101 5280
	1890	3990		1667	4213
Northern Union	113 5280	3 5280	.....	1 5280	115 5280
	5200				5200
Westchester Lighting Company....	29 5280	.....	.....	.....	29 5280
	4524	2220			1464
Bronx Gas and Electric Company..	18 5280	1 5280	.....	.....	20 5280
	5097	3179		1667	1329
Total Bronx	266 5280	22 5280	.....	1 5280	288 5280
	67	478	1767	2808	1250
Total Manhattan and The Bronx..	1590 5280	32 5280	14 5280	8 5280	1599 5280

Inventory of Supplies for Repairs to Gas Lamps to December 29, 1903.

	On Hand in Store-house and Store-room.	Material given out Since June 30, 1903. Manhattan.	Material given out Since June 30, 1903. Bronx.	Material Called for on Contracts, 1903.	Material Received on 1903 Contracts.	Material Still to Come on 1903 Contracts.	Remarks.
Square lanterns	695	1,733	959	3,500	3,373	127	
Boulevard globes	146	812	100	2,500	433	2,067	
Boulevard tops	383	267	177	1,000	800	200	
Boulevard reflectors	451	230	120	700	486	214	
Bridge globes	22	4	17	50	42	8	
Bridge tops	39	2	6	25	25	....	
Bridge reflectors	37	5	....	25	25	....	
Fire alarm lamps	88	166	....	....	....	....	
Fire alarm doors	3	....	....	....	....	....	
Fire alarm signs	82	37	....	....	....	....	
Miner globes, green	2	....	....	....	....	....	
Miner globes, white	72	4	12	200	87	113	
Miner lamps	....	....	....	100	....	100	J. N. Early has our sample of this lamp.
Police globes, bridge size	4	....	....	....	....	....	
Police globes, Boulevard size	49	2	....	50	....	50	Shipped.
Boulevard band globes	3	....	....	....	....	....	
Wall brackets, prong	4	4	....	50	....	50	
Wall brackets, screw	5	....	....				
Wall brackets, transverse road	25	....	....	....	....	....	This number is excluding (8) to be delivered to Interurban Street Railway Co.
Crossheads, boulevard	5	....	2	....	....	....	
Crossheads, small	511	105	73	500	500	....	500 of these are at foot West Fifty-sixth street, and 11 at storehouse.
Lamp irons, boulevard	344	38	135	200	200	....	
Lamp irons, small	37	324	125	300	300	....	
Lamp-posts, old style	400	....	....	400	400	....	These posts are at foot West Fifty-sixth street, instead of storehouse.
Lamp-posts, Empire	1	....	....	100	1	99	
Lamp-posts, old ornamental	1	....	....	....	....	....	
Viaduct lamps	7	....	....	....	....	....	

Lamp Account, 1903.

Number of gas lamps lighted December 31, 1902	23,754	
Number of naphtha lamps lighted December 31, 1902	1,474	
Number of electric lamps lighted December 31, 1902	5,169	
Number of Welsbach naphtha lamps December 31, 1902	853	
		31,250
Number of new gas lamps lighted during the year	197	
Number of new naphtha lamps lighted during the year	15	
Number of new electric lamps lighted during the year	116	
Number of new Welsbach naphtha lamps during the year	9	
		337
Number of old gas lamps relighted during the year	2,748	
Number of old naphtha lamps relighted during the year	10	
Number of old electric lamps relighted during the year	13	
Number of Welsbach lamps relighted during the year	9	
		2,780
		34,367
Less gas lamps discontnued during the year	2,022	
Less naphtha lamps discontinued during the year	60	
Less Welsbach naphtha lamps discontinued during the year	17	
Less electric lamps discontinued during the year	17	
		2,116
Total number of lamps lighted December 31, 1903		32,251

SUMMARY.

Total gas lamps (ordinary) December 31	18,516	
Total single Welsbach, December 31	5,062	
Total double Welsbach lamps, December 31	16	
Total naphtha lamps lighted December 31	1,439	
Total Welsbach naphtha lamps lighted December 31	854	
Total electric lamps lighted December 31	5,281	
Total number of ordinary gas lamps, street signs	1,083	
		32,251

Gas Impurities.

The following statement shows the average amount of impurities found in the gases of such of the companies as have gas mains on the line of our photometric stations, as determined by the analyses of Dr. E. G. Love, Ph. D., our Gas Examiner, in the laboratories of this Bureau:

Of What Company.	Sulphur Grains in 100 Cubic Feet. 1st Quarter.	2d Quarter.	3d Quarter.	4th Quarter.	Ammonia Grains in 100 Cubic Feet. 1st Quarter.	2d Quarter.	3d Quarter.	4th Quarter.	Sulphuretted Hydrogen.
Consolidated Gas Company—									
Twenty-first Street Station	12.10	11.16	10.04	9.60	0.22	0.18	0.14	0.20	Trace
Fourteenth and Eighteenth Street Stations	14.04	13.12	14.60	15.06	0.96	1.14	1.04	0.88	.....
Forty-fourth Street Station	8.80	9.04	8.32	7.76	0.18	0.14	0.12	0.16	.....
Forty-second Street Station	11.36	12.20	12.64	12.38	1.10	1.26	1.10	1.02	.....
Ninety-ninth Street Station	8.06	7.96	8.46	7.82	0.20	0.20	0.18	0.20	.....
New York Mutual Gaslight Co	6.44	6.14	7.14	6.88	0.08	0.10	0.10	0.14	Trace
New Amsterdam Gas Company—									
Equitable branch	8.14	7.96	8.04	8.10	0.09	0.08	0.08	0.10	.....
East river branch	8.04	8.04	8.10	8.06	0.08	0.10	0.09	0.08	.....
Standard Gaslight Company	7.94	8.20	7.68	7.90	0.16	0.18	0.14	0.16	.....

The following shows the specific gravity of the gas:

Of What Company.	1st Quarter.	2d Quarter.	3d Quarter.	4th Quarter.
Consolidated Gas Company—				
Twenty-first Street Station	.657	.652	.644	.644
Fourteenth and Eighteenth Street Stations	.576	.579	.573	.548
Forty-fourth Street Station	.576	.654	.646	.650
Forty-second Street Station	.648	.634	.640	.632
Ninety-ninth Street Station	.647	.632	.648	.631
New York Mutual Gas Light Company	.687	.678	.664	.660
New Amsterdam Gas Company—				
Equitable branch	.666	.649	.654	.654
East river branch	.648	.642	.655	.644
Standard Gas Light Company	.624	.636	.642	.629

The following statement shows the average maximum and minimum pressure on the mains of such companies as connect with our photometric stations, as recorded on the pressure registers, the average being made for the time during which the public lamps are required to be kept lighted:

Of What Company.	Average Maximum Pressure—Inches. 1st Quarter.	2d Quarter.	3d Quarter.	4th Quarter.	Average Minimum Pressure—Inches. 1st Quarter.	2d Quarter.	3d Quarter.	4th Quarter.	Where Taken Distance From Gas Works.
Consolidated Gas Company—									
Twenty-first Street Station	2.47	2.56	2.53	2.84	2.08	2.00	2.00	2.10	1.66
Fourteenth and Eighteenth Street Stations	3.34	3.21	3.16	3.81	1.93	2.15	2.22	1.90	1.66
Forty-fourth Street Station	3.16	3.59	3.74	3.40	1.75	2.03	2.10	1.67	3.84
Forty-second Street Station	4.09	4.18	4.34	4.20	2.23	2.33	2.42	2.25	3.35
Ninety-ninth Street Station	3.61	3.16	3.20	3.14	2.12	2.12	2.12	2.13	1.05
New York Mutual Gas Company	3.72	3.43	3.46	3.40	3.12	3.04	3.03	3.00	1.61
New Amsterdam Gas Company—									
Equitable branch	2.28	2.43	2.39	2.57	1.94	2.00	1.97	1.58	2.18
East river branch	3.33	2.99	2.50	3.63	2.20	2.21	2.01	1.90	1.05
Standard Gas Light Company	2.49	2.77	2.84	2.54	1.75	2.19	2.31	2.14	1.39

EXHIBIT "E."

Statement Giving the Illuminating Power in Candles of the Gases Supplied to the City by the Several Gas-light Companies during the Year ending December 31, 1903, as Shown by the Daily Observations at the Photometrical Rooms of the Department of Public Works.

Month of	East River Gas Company, Illuminating Power in Candles. Lowest.	Highest.	Average.	Consolidated Gas Company, Branch 1, Illuminating Power in Candles. Lowest.	Highest.	Average.	Consolidated Gas Company, Branch 2, Illuminating Power in Candles. Lowest.	Highest.	Average.	Consolidated Gas Company, Branch 3, Illuminating Power in Candles. Lowest.	Highest.	Average.	Consolidated Gas Company, Branch 4, Illuminating Power in Candles. Lowest.	Highest.	Average.	Consolidated Gas Company, Branch 6, Illuminating Power in Candles. Lowest.	Highest.	Average.	New York Mutual Gas-light Company, Illuminating Power in Candles. Lowest.	Highest.	Average.	Equitable Gas-light Company, Illuminating Power in Candles. Lowest.	Highest.	Average.	Standard Gas-light Company, Illuminating Power in Candles. Lowest.	Highest.	Average.
January	23.78	25.36	24.83	20.16	22.04	20.94	19.64	22.54	20.51	19.84	22.20	21.11	24.79	25.32	25.04	20.12	21.56	20.75	20.00	21.78	20.84	23.44	25.20	24.67	20.64	24.42	22.69
February	23.90	25.38	24.53	18.35	22.68	20.67	20.06	22.18	21.32	20.06	23.16	21.59	23.98	25.14	24.64	21.14	22.16	21.64	20.06	23.98	21.82	23.84	25.10	24.35	20.00	23.85	22.52
March	24.46	25.46	24.89	21.48	22.52	22.00	21.34	23.32	22.44	20.06	22.30	21.24	20.69	24.68	23.52	20.32	22.88	21.81	21.40	23.14	22.61	23.86	24.26	24.04	23.72	24.82	24.33
April	23.85	24.90	24.31	21.52	23.17	22.60	21.54	23.66	22.59	21.44	22.76	22.24	23.01	24.72	23.99	20.82	23.54	22.42	19.12	23.19	21.04	22.87	24.22	23.55	22.14	24.42	23.76
May	22.60	23.46	23.02	22.54	23.62	22.97	21.24	22.68	21.05	21.82	25.48	23.72	17.64	21.66	20.00	21.45	23.59	22.47	22.89	25.02	23.76	22.43	23.67	23.21	22.04	23.96	22.65
June	21.72	23.34	22.67	20.58	22.20	21.44	17.91	21.07	20.11	20.02	23.32	21.17	17.46	22.53	19.54	20.56	21.79	21.28	17.94	23.45	21.58	21.54	22.99	22.54	20.54	22.36	21.71
July	22.92	24.50	23.54	21.72	24.22	22.59	21.54	23.03	22.15	20.66	21.56	21.29	21.30	24.62	22.31	20.84	22.76	21.84	17.14	23.30	20.70	21.37	23.42	22.45	20.41	24.06	22.32
August	22.24	22.64	22.10	21.30	23.80	22.34	20.88	23.22	21.59	19.72	22.38	21.28	20.59	23.00	21.83	20.30	21.58	20.73	20.32	23.94	22.55	21.86	23.05	22.43	20.08	23.56	21.61
September	22.58	23.38	22.89	20.26	22.75	21.10	20.04	21.74	20.77	20.66	21.88	21.20	21.64	23.42	22.26	20.77	22.38	21.70	20.36	22.26	21.42	23.00	23.86	23.32	21.82	24.09	22.45
October	22.22	24.40	23.34	20.46	22.70	21.42	20.66	21.60	21.21	18.32	23.14	20.99	22.48	24.66	23.27	20.52	22.42	21.44	18.45	22.07	20.43	22.17	23.84	22.01	21.36	23.12	22.25
November	22.80	23.70	23.22	20.40	23.29	21.83	20.79	21.48	20.88	20.46	20.82	20.63	21.86	24.29	23.20	20.41	20.70	20.49	20.44	21.42	20.97	22.62	23.66	23.17	20.20	21.74	21.15
December	23.40	24.72	23.80	15.18	23.66	21.59	18.06	20.92	19.76	18.02	20.38	19.69	23.42	24.80	23.86	20.18	21.58	20.79	17.70	20.97	19.69	22.62	24.08	23.26	21.26	22.28	21.62
Average	23.04	24.22	23.59	20.58	23.05	21.79	20.35	22.29	21.27	20.09	22.45	21.35	21.57	23.98	22.79	20.62	20.58	21.45	19.65	22.88	21.53	22.63	23.95	23.33	21.19	23.48	22.32
Distance from Gas Works... Testing Burner.	1 30/100 Miles Bray's Slit Union No. 7.			1 86/100 Miles Bray's Slit Union No. 7.			1 60/100 Miles Bray's Slit Union No. 7.			3 64/100 Miles Bray's Slit Union No. 7.			3 30/100 Miles Bray's Slit Union No. 7.			1 86/100 Miles Bray's Slit Union No. 7.			1 60/100 Miles Bray's Slit Union No. 7.			2 70/100 Miles Bray's Slit Union No. 7.			1 5/100 Miles Bray's Slit Union No. 7		

"V."

Report submitted to the Hon. Seth Low, Mayor, and Chairman of the Board of Estimate and Apportionment, by Robert Grier Monroe, Commissioner of Water Supply, Gas and Electricity, on Municipal Lighting, March, 1903.

Department of Water Supply, Gas and Electricity,
Commissioner's Office, Nos. 13-21 Park Row,
City of New York, March 12, 1903.

Hon. SETH LOW, Mayor of The City of New York and Chairman of the Board of Estimate and Apportionment, City Hall:

Sir—I herewith transmit a summary of bids received for public lighting for the current year, with corresponding prices for the year 1902. I also forward a report from Mr. Charles F. Lacombe, Engineer of Surface Construction, which report contains a statement of prices paid in other cities for gas and electric lighting, with charts clearly indicating the comparative cost, from which it appears that New York is paying far more in proportion than any other municipality.

The proposals issued to all bidders for this year contain the following paragraph:

"20. The Commissioner reserves the right to reject any or all bids or estimates if the Board of Estimate and Apportionment shall determine it for the public interest of the City so to do."

I am unwilling to execute the contracts upon the bids submitted, and I recommend in the interest of the public that all bids be rejected.

Section 530 of the Charter directs that such contracts shall be made after public bidding, and for a term of not exceeding one year. That section is taken from section 573 (chapter 378) of the Charter of 1897, and must have been drawn originally to meet then existing conditions, and with the expectation of securing actual competition in the prices between rival companies operating in the same field. Within the past five years the lighting interests in this City have all practically united, and even in those boroughs where there has been no formal consolidation the territory has been apportioned. In the Borough of Manhattan both illuminants have been absorbed by a single corporation, and there is no rivalry even between producers of gas and producers of electricity. The Consolidated Gas Company of New York controls all the gas and electric light facilities in the Borough of Manhattan, as well as all gas and electric light facilities in the more important sections of the Borough of The Bronx. As far as gas light is concerned, not only does the price remain fixed, but all improvement in the utilization of gas is retarded.

A wide extension of street lamps provided with incandescent mantles is greatly needed. By this method the same consumption of gas produces three times the illumination given by the open burner. It costs Chicago $2.40 a year additional for a lamp with an incandescent mantle. It costs the Borough of Manhattan $11.50 additional, and for the same improvement we must pay $15 a year in Brooklyn. The Consolidated Gas Company agrees to furnish the ordinary street lamp with open gas burner at $17.50 per year, and its bid for gas lamps with mantles is $29 per lamp per year. Neither the Standard Gas Light Company nor the New Amsterdam Gas Light Company (both controlled by the Consolidated Gas Company) bids for incandescent gas lights. Both agree to furnish the ordinary gas lights for much less than $17.50—the Standard for $13.04 1-3 per lamp per year, and the New Amsterdam for $12.

Their bids are for such lights as are or may be on the line or lines of their mains. These comparatively low bids are induced by restrictions in their charters, but the City is virtually prevented from getting the benefit of these lower bids as far as incandescent or mantle lights are concerned. If it is desired to substitute on a Standard or New Amsterdam lamp an incandescent burner for the ordinary open burner, it is necessary to transfer the lamp from the mains, or, to speak more accurately, from the books of one of those companies to the books of the Consolidated Gas Company, paying, of course, the latter company's price.

On the Chicago basis of prices we could save enough on the 5,500 high-priced Welsbach lamps in use in Manhattan and The Bronx to change 20,000 ineffective open flame burners to incandescent mantle lights, improving the illumination of our poorly lit streets in those boroughs 100 per cent. and saving $40,000 of the present appropriation.

In The Bronx the Central Union Gas Company (controlled by the Consolidated Gas Company) bids $22 for the open flame lamp; the Northern Union Gas Company (controlled by the Consolidated Gas Company) and the Westchester Lighting Company (controlled by the United Gas Improvement Company of Philadelphia) each bids $24, but each of these three bids covers a distinct and separate district. These exorbitant prices, so nearly alike, present an analogous situation to that which existed in 1876 when Hon. William C. Whitney, then Corporation Counsel, advised the Mayor that there was conclusive evidence of collusion, and when, as a result of the rejection of all bids, a subsequent agreement was made by the same companies as had previously bid to supply the City at greatly reduced rates. The Bronx Gas and Electric Company puts in no bids for gas lights, and finds itself with no opposing bids for electric lights in the section it covers. An analysis of the bids in other boroughs does not show any keener competition. No independent gas company in any district has bid against another independent gas company; no independent electric light company has bid against another independent electric light company. In the entire five boroughs there have been no opposing bidders for supplying the same class of light to the same district—unless we may consider the Welsbach Company, which has put in a bid, but higher than that of the Consolidated Gas Company, for its own "Welsbach" mantle lights.

In 1865 the courts held that the provision of law requiring that contracts for work or supplies must after presentation of sealed bids be given to the lowest bidder, was not applicable to the Harlem Gas Light Company, because it had a monopoly. Judge Monell said (3 Rob. at pp. 121-2):

"It is not perhaps too much to say that in every species of work or supplies which can be competed for it is the duty of the corporation to invite proposals, and to give the contract to the lowest bidder. But where there is no possibility of competition, and in respect to whose manufacture one company has the complete monopoly, it seems to me that the provisions of the Charter cannot be deemed to apply, and therefore impose no duty. The law must have a reasonable construction. If the object in a given case fails of accomplishment, the law construed by its intention must also fail. To advertise for proposals for a supply of gas in a district exclusively occupied by one gas company would be a practical absurdity. It would enable that company to propose for the supply at a price much beyond the fair value; and its single bid (under the Charter of 1861) would entitle it to the contract at the price named, thus defeating the end designed, to secure the City from favoritism and jobbing.

"It is not necessary to deny that illuminating gas comes under the denomination of supplies; but the word in its application to the subject of contracts must be restricted in its signification and meaning to supplies which are or may be the subject of a general competition, and which can be furnished by more than one person or company. Any other meaning given to the word would impute to the legislature the design of scheming with contractors to defraud the corporation, rather than an intention to protect its public treasury."

Judge Porter said (33 N. Y., at pp. 324-5):

"In the present case, an adoption of the construction claimed by the municipal authorities would lead to the absurd conclusion that the legislature designed to force a provision into the City Charter compelling the corporation to pay whatever price the sole bidder might choose to exact in his sealed proposals for the use of property in which he has an absolute monopoly, and in relation to which there can be no competition within the range of legal possibility."

Moreover, in my opinion, the provisions of section 530 of the Charter are too inelastic to permit the City being effectively benefited by competition, were actual competitors in the field. The term of one year is also too short a period for an advantageous contract.

I therefore recommend that section 530 of the Charter be so amended that the Commissioner of Water Supply, Gas and Electricity may make such contracts without public bidding and for a term of not exceeding three years, when authorized by the Board of Estimate and Apportionment. If these amendments be passed the Board of Estimate and Apportionment can consider all questions relating to the cost of manufacture and distribution of the supplies under consideration, and contracts fair to both parties can be entered into.

The appropriation for all public lighting for this year, 1903, is $3,306,346.23. The corresponding appropriation in 1898, the first year of Greater New York's existence, amounted to $2,570,001.88. The increase in five years has been $736,344.35, or between 28 and 29 per cent. Notwithstanding this increase, the sum appropriated this year, in view of the prices asked, is entirely inadequate to meet the reasonable requirments of the City. There can be little improvement in the densely populated sections which are now insufficiently lighted, and large areas which have recently been improved must for the time being be left without any lights at all.

The growth of the City, the many public improvements which are now under way—as, for example, the new bridges which are rapidly nearing completion—all mean a great increase of public lighting; and unless there is a material reduction in prices the annual appropriation five years hence must necessarily equal or exceed $5,000,000.

I have called your attention to the fact that the mantle or incandescent gas light is a great improvement over the old open burner. Electricity is the illuminant, however, of the greatest importance for public lighting. Sixty per cent. of our entire appropriation for this year, or about $2,000,000, will be expended for electric lights.

In the Borough of Manhattan the price bid for a 2,000 candle-power lamp is $146. The price in Brooklyn for a 1,200 candle-power lamp is $124.50. I have secured from 68 cities throughout the country the prices paid to the various electric light companies for supplying these cities with 2,000 candle-power lamps, and the average price is $88.60. In 23 other cities using 1,200 candle-power lamps the average price is $81.08. The combination which now imposes exorbitant prices upon New York is formidable, but to my mind its strength is more apparent than real.

The capitalization of the electric light companies in our City may be best exemplified by the New York Edison Company. It is now capitalized at $45,200,000 in stock, subject to $40,138,000 bonds, making the total $85,338,000. The original company, the Edison Electric Illuminating Company, which seems to have had a fairly conservative management and capitalization ($9,200,000 stock, subject to $6,500,000 bonds), was bought by a syndicate early in 1899. This syndicate at the same time bought the bonds and stock of certain comparatively small companies, and then turned the whole over to the newly-formed New York Gas and Electric Light, Heat and Power Company for $28,500,000 bonds of that company and $36,000,000 stock. Shortly thereafter the illuminating and power companies consolidated with each other by adding the $9,200,000 of illuminating company stock to the $36,000,000 power company stock, and forming the present New York Edison Company. The original nominal capital, which was increased to the present figures by this legerdemain, was as follows:

Edison Electric Illuminating Company (bonds)	$6,500,000 00
Edison Electric Illuminating Company (stock)	9,200,000 00
Mount Morris Electric Light Company (bonds)	988,000 00
Mount Morris Electric Light Company (stock)	1,500,000 00
North River Electric Light and Power Company (bonds)	104,000 00
North River Electric Light and Power Company (stock)	400,000 00
New York Light, Heat and Power Company (bonds)	320,000 00
New York Light, Heat and Power Company (stock)	375,000 00
Borough of Manhattan Electric Company (stock)	100,000 00
Manhattan Lighting Company (bonds)	250,000 00
Manhattan Lighting Company (stock)	250,000 00
Block Lighting and Power Company No. 1 (stock)	98,000 00
*Yonkers Electric Light and Power Company (bonds)	200,000 00
Yonkers Electric Light and Power Company (stock)	190,100 00
*Consolidated Telegraph and Electric Subway Company (bonds)	4,225,000 00
Consolidated Telegraph and Electric Subway Company (stock)	1,514,000 00
Cash contributed by power company from proceeds of mortgage	4,000,000 00
Total	$30,214,100 00

* There is a minority interest of $9,900 Yonkers stock and $359,000 Consolidated Subway stock outstanding.

An analysis of the figures in this table will show, however, that they are altogether too high, and that the original nominal capital was itself very much inflated. The figures given for the Edison Electric Illuminating Company are probably not far out of the way. No account is taken of the very great depreciation in the values upon which the capitalization had been originally based (particularly by reason of the abandonment of a number of stations), but, on the other hand, this was probably offset by a surplus reported to the stockholders of about $2,800,000 at the time of the consolidation. The Mount Morris Company, however, was barely earning the interest on its bonds, so that its stock was probably practically worthless, the Borough of Manhattan Company was an operating concern with no plant of its own; the plants of the Manhattan Lighting Company and the Block Company had been abandoned; while the bonds of the Consolidated Subway Company had been issued at a considerable discount, and its stock, as I am informed, either without consideration or in consideration of patent rights now of no value.

This enormous valuation is based upon the profit permitted by the present monopoly system. Modern improvements, especially in the concentration of the work of producing power (which, incidentally, as above stated, caused the abandonment of so much of the original plant of the company), have so rapidly decreased the expense that, while the cost to the company per kilowatt hour of current delivered is known to have been over five cents in 1900 and about four and a half cents in 1901, there is good reason to believe that it has since been rduced to about three cents. I do not find, however, that there has been a corresponding reduction in prices. The bills presented to the Department for lighting public buildings for January, 1903, show that the City is charged upon an average at the rate of ten and fifteen-hundredths cents per kilowatt hour.

There can be no question but that the capitalization of the Edison Company represents several times the value of its plant. If The City of New York would undertake to supply itself with electric light, its interest charges would be limited to the amount actually expended on its plant, and it would not be burdened with the necessity of declaring dividends on watered stock. In the Borough of Manhattan the electrical conductors would be carried through the existing subways without incurring any expense by way of rental for the space occupied. These subways are divided in ownership between two subway companies, but each of them is bound by its franchise to "without charge supply to The City of New York all space in said subway necessary for its electrical conductors and the electrical conductors of each separate department of said City which may now or hereafter be required." I am informed by officers of the Edison Company that the subway rentals for electrical conductors which are now used for City lights amount to a hundred thousand dollars a year. If the City had an electric light plant the cost of distribution would be reduced by that amount.

The total cost to the New York Edison Company for generating and distributing electrical energy is, as I have stated, probably less than three cents per killowatt hour for energy delivered at the lamp terminal. A pair of lamps such as are used on Fifth avenue take about 750 watts and consume in one year, on the basis of 4,000 hours burning, 3,000 kilowatt hours, costing $90, equal to $45 per lamp. This figure is probably in excess of the actual cost. The difference between $90 and $182.50 (the bid per pair of 900 candle power lamps), equal to $92.50, includes maintenance of the lamps, interest on the investment and profit. The total cost of maintenance per lamp should not at the outside be ten dollars. The system used by the Edison Company is the direct current enclosed arc system, and it is used by them not because it is the most economical for street lighting, but because it fits in with other requirements—

that is to say, with general commercial uses. On this system there is the loss in resistance of about 46 per cent. of the energy delivered to the lamp.

The city can adopt a system by which this loss can be largely saved.

The city of New York would have, therefore, three definite advantages over such a company as the New York Edison Company in supplying electricity for public uses:

(a) Low interest payments based on loans measured by funds actually required for construction as distinguished from the fixed charges which burden an inflated capitalization.

(b) The free use of subway rights, which the City has had for years, and from which it has until now benefited only to a small degree.

(c) Economy in construction and operation resulting from the adoption of all recent improvements and from having in view a single purpose—public lighting—without the complication incident to furnishing a general commercial supply.

On December 24, 1887, Chicago placed in operation its first municipal lighting station, and on the 24th of December last completed its fifteenth year of municipal ownership and operation of an electric lighting system. For the year 1902 the total cost per lamp of 2,000 candle power per year is stated by it to be $53.51. The city of Chicago also publishes a report showing all that has been expended for construction and operation of its electric light plant from 1887 to 1902. It has cost that city during sixteen years $3,400,663.05. The total amount rented electric lights would have cost Chicago for the corresponding period is $3,535,875.50. I do not know that Chicago gives us the most successful example of municipal lighting, but their statement does not involve intricate questions of bookkeeping. It does show that Chicago has earned the cost of its electric plant, which includes the cost of considerable subway construction. The plant at present provides 4,640 arc lamps of 2,000 candle power.

Detroit also has a municipal plant. In a report dated June 30, 1902, the cost of a 2,000 candle power lamp for Detroit is given at $63.82. That sum includes operating disbursements, interest of 4 per cent. on investment, depreciation of 3 per cent. and loss of taxes (that is to say, the taxes that would have been paid on a corresponding plant owned by a private company). The Electrical World and Engineer makes a critical analysis of this report in its issue of February 28, and expresses the opinion that 2,000 candle power lamps cost the city of Detroit $80 instead of $63.50. $80, however, compares very favorably with $146, that we are asked to pay.

I believe that New York with its own plant could provide electric lighting for public uses at a cost much below what is now charged the City. Whether reasonable prices can be obtained from private companies or whether the City can with better results maintain and operate its own plant is for you to determine. I do, however, urge that legislation be immediately asked and that you be given the power to establish and maintain an electric plant for street lighting in case later you decide that it is in the interest of the public so to do.

Respectfully,

R. G. MONROE,

Commissioner of Water Supply, Gas and Electricity.

PUBLIC LIGHTING.

The following tables show the bids received for public lighting for the year 1903 as compared with the prices for such lighting contained in the contracts for the year 1902:

Bids for Gas Lighting in Greater New York for 1903.

Company.	Gas—20 C. P.	Gas—21 C. P.	Gas—22 C. P.	Gas—25 C. P. (3-foot Burner).	Gas—25 C. P. (4-foot Burner).	Gas—25 C. P. (5-foot Burner).	Lamppost Straightened.	Column Releaded.	Column Recaulked.	Column Refitted.	Service Refitted.	Standpipe Refitted.	Lamppost Removed.	Lamppost Reset.	New Lamp Fitted.	Buildings, per 1,000 cu. ft.	Naphtha.	Welsbach, Naphtha, 70 C. P.	Welsbach, Gas or Naphtha, 60 C. P., Single.	Welsbach, Gas or Naphtha, 60 C. P., Double.	Welsbach Single.	Welsbach Double.	Oil, Per Lamp, 25 C. P.	Borough.	Remarks.
Consolidated Gas Company	.....	....	17 50	....	....	....	1 50	2 50	1 00	3 50	5 50	2 50	3 50	8 00	8 00	90	....	....	29 00	47 00	....	..	....	Manhattan.	Entire Manhattan including southerly fixed span and draw span of Madison Avenue Bridge, and same of Central Bridge, all High and Washington Bridges.
	.....	..	17 50	..	....	..	1 50	1 50		3 50	5 50	2 50	3 50	8 00	8 00	90	..	..	29 00	47 00	.	....	....		
Standard Gas Light Company	13 04⅓	....	....	....	....	....	1 50	1 50	90	3 50	5 50	2 50	4 50	10 00	10 00	90	....	....	....	....	....	....	....		All lamps situated on line of mains of company, except such streets and places as now lighted or may be lighted by electric light.
	13 04⅓	..	....	....	....	..	1 50	1 50		3 50	5 50	2 50	4 50	10 00	10 00	90	..	....	....	....	....	....	....		
New Amsterdam Gas Company	....	....	....	12 00			1 50	1 50	1 00	3 50	4 00	4 00	3 50	10 00	10 00	90	....	....	....	....	....	....	....		In all streets, avenues, piers, parks and public places along the line of mains of company and buildings on line of mains.
	....	....	..	12 00	..	..	1 50	1 50		3 50	4 00	4 00	3 50	10 00	10 00	90	..	....	....	....	....	....	....		
New York Mutual Gas Light Company	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....	90	....	....	....	....	....	....	....		New York and Brooklyn Bridge, Street Cleaning (No. 17 Varick street), High School (No. 146 Grand street), No. 165 Madison street, Rivington, Grand and Essex streets, East Broadway and Scammel street, Rivington and Suffolk streets, No. 123 Attorney street, C. C. N. Y., Park Cottages, City Bindery, Duane street.
	....	...	....	....	....	....	....	....	....	....	...	...	....	....	....	....	....	....	....	....	...	....	....		
New York and New Jersey Globe Gas Light Company	....	....	....	....	....	....	....	...	....	....	....	....	....	...	....	...	22 00	....	....	....	....	....	....		In such districts as directed.
	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....	..	22 00	..	....	....	....	....	....		
Welsbach Street Lighting Company of America	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	....	30 00	30 00	47 00	18 00	25 00	....		In all locations as ordered Gas company refits service, erects lamps without charge on posts furnished by City or gas companies.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	30 00	30 00	47 00	18 00	25 00	..		
Central Union Gas Company	....	22 00	....	....	....	....	1 50	2 25	1 25	3 00	3 50	2 00	3 50	8 00	8 00	90	....	....	....	....	....	....	....		Twenty-third Ward.
	....	22 00	..	....	....	..	1 50	1 50		3 00	3 50	2 00	3 50	8 00	8 00	90	..	....	....	....	....	....	....		
Westchester Lighting Company	24 00	....	....	....	....	....	1 00	1 00	1 00	1 00	3 50	2 00	1 50	8 00	8 00	1 10	....	....	....	....	....	....	....		Former Town of Kingsbridge.
	24 00	..	....	....	....	..	1 00	1 00		1 00	3 50	2 00	1 50	8 00	8 00	1 15	..	....	....	....	....	....	....		
Northern Union Gas Company	24 00	....	....	....	....	....	1 50	2 50	1 25	3 00	3 50	2 00	3 50	8 00	8 00	90	....	....	....	....	....	....	....		Twenty-fourth Ward, except former Town of Kingsbridge.
	24 00	..	....	....	....	..	1 50	1 50		3 00	3 50	2 00	3 50	8 00	8 00	90	..	....	....	....	....	....	....	The Bronx...	
New York and New Jersey Globe Gas Light Company	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	22 00	....	....	....	....	....	....		Woodlawn, Wakefield, Williamsbridge, Eastchester, Bronx Park and other parks and districts directed.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	22 00	..	....	....	....	....	....		
Welsbach Street Lighting Company of America	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	30 00	30 00	47 00	18 00	25 00	....		Parks, parkways and streets wherever odered. Gas company refits service, erects lamps without charge on posts furnished by City or gas companies.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	30 00	30 00	47 00	18 00	25 00	..		
Brooklyn Borough Gas Company	21 00	....	....	....	....	....	1 50	1 50	1 00	3 50	4 00	4 00	3 50	7 50	9 00	1 00	....	....	....	....	....	....	....		Fifty or more lamps on lines of mains in Thirty-first Ward.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....		
Brooklyn Union Gas Company	16 00	....	....	....	....	....	1 50	1 50	1 50	3 50	4 00	4 00	3 50	10 00	10 00	90	....	....	31 00	....	....	....	....		Except Thirtieth and Thirty-first Wards.
	16 00	..	....	....	....	..	1 50	1 50		3 50	4 00	4 00	3 50	10 00	10 00	90	..	..	31 00	..	....	....	....		
Flatbush Gas Company	16 00	....	....	....	....	....	1 50	1 50	1 50	3 50	4 00	4 00	3 50	10 00	10 00	1 00	....	....	31 00	....	....	....	....		Twenty-ninth Ward.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....		
New York and New Jersey Globe Gas Light Company	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	22 00	....	....	....	....	....	....	Brooklyn	Sheepshead Bay, Gravesend, Flatlands, and districts as directed.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	22 00	..	....	....	....	....	....		
Welsbach Street Lighting Company of America	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	30 00	30 00	47 00	18 00	25 00	....		Prospect Park, Cooper Park, Carroll Park and other parks and places as odered. Gas company refits sevice, erects lamps without charge on posts furnished by City or gas companies.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	30 00	30 00	47 00	18 00	25 00	..		
Newtown and Flushing Gas Company	25 00	....	....	...	....	....	1 50	1 50	1 50	3 50	5 00	2 50	4 00	8 00	8 00	1 00	....	....	31 50	....	....	....	....		Points designated by City authorities in former Town of Flushing.
	25 00	..	....	....	....	..	1 50	1 50		3 50	5 00	2 50	3 50	8 00	8 00	1 00	..	..	31 50	..	....	....	....		
Queens Borough Gas and Electric Company	25 00	....	....	....	....	....	1 50	1 50	1 50	3 50	5 00	2 50	3 50	8 00	8 00	1 60	....	....	30 00	....	....	....	....		Former Village of "Arverne-by-the-Sea" and "Rockaway Beach."
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....		
Richmond Hill and Queens County Gas Light Company	22 00	....	...	....	....	....	1 50	1 50	1 50	3 50	4 00	4 00	3 50	10 00	10 00	1 25	22 00	....	31 00	....	....	....	....		Wherever company has its mains or shall have them hereafter.
	22 00	..	....	....	....	..	1 50	1 50		3 50	4 00	4 00	3 50	10 00	10 00	1 25	..	..	31 00	..	....	....	....		
Jamaica Gas Light Company	22 00	....	....	....	....	....	1 50	1 50	1 50	3 50	4 00	4 00	3 50	10 00	10 00	1 25	22 00	....	31 00	....	....	....	....		Wherever company has its mains or shall have them hereafter.
	22 00	..	....	....	....	..	1 50	1 50		3 50	4 00	4 00	3 50	10 00	10 00	1 25	..	..	31 00	..	....	....	....		
East River Gas Company of Long Island City	....	....	....	20 00	25 00	30 00	1 50	1 50	1 00	3 50	4 00	4 00	3 50	10 00	10 00	90	....	....	....	....	....	....	....		In all streets, avenues, piers, parks and public places along line of mains; lamps not to be less than 500. Buildings along line of mains.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Queens	
Woodhaven Gas Light Company	22 00	....	....	....	....	....	1 50	1 50	1 50	3 50	4 00	4 00	3 50	10 60	10 00	1 25	22 00	....	31 00	....	....	...	....		Wherever company has its mains or shall have them hereafter.
	22 00	..	....	....	....	..	1 50	1 50		3 50	4 00	4 00	3 50	10 00	10 00	1 25	..	..	31 00	..	....	....	....		
Newtown Gas Company.	25 00	....	....	....	....	....	1 50	1 50	1 50	3 50	4 00	4 00	3 50	10 00	10 00	1 25	25 00	....	31 00	....	....	....	....		Wherever company has its mains or shall have them hereafter.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	1 25	..	....	....	....	....	....	....		
New York and New Jersey Globe Gas Light Company	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	30 96	....	Arverne					Such streets or districts as may be directed.
	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	22 00	31 50	....	Rockaway Beach					
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	30 96	....	Arverne					
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	22 00	31 50	....	Rockaway Beach					
Welsbach Street Lighting Company of America	....	....	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	30 00	30 00	47 00	18 00	25 00	....		Such places as may be ordered. Gas company refits service, erects lamps without charge on posts furnished by City or company.
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	30 00	30 00	47 00	18 00	25 00	..		
New York and Richmond Gas Company	....	....	....	....	....	....	1 50	1 50	1 50	8 00	4 00	4 00	3 50	10 00	10 00	1 25	....	...	30 00	....	....	....	....	Richmond ...	500 lamps. Estimated amount of bid, $22,250.
Alexander Van Pelt	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	12 00		
	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	12 00		

Bids for the Electric Lighting of Greater New York for 1903.

Boroughs.	Company.	Class 1A—600 C. P.	Class 2B—Incl. Direct Low Tension, 275 Watts.	Class 3A—1,200 C. P.	Class 3B—1,200 C. P.	Class 3C—1,200 C. P.	Class 4A—Open Direct Current, High Tension Series, Brush or Thomson-Houston, 425 Watts.	Class 4A Special—Dusk-Midnight.	Class 4B—Incl. Direct Low Tension, 425 Watts.	Class 4C—2,000 C. P. Alternating Incl., 450 Watts.	Class 4B—Pairs Arcs on Each Post; Open or Incl. Direct Low Tension, 425 Watts.	2,000 C. P., 450 True Watts, Incl. Alternating Series, 450 Watts.	Moving Arc or Incandescent Lamps.	Incandescent, 25 C. P.	Buildings. Per Kilowatt Hour.	Remarks.
Manhattan	United Electric Light and Power Company	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	146 00	.....	.....	12c., or when consumption in each building is 2,000 K. W. hours per month for 8 months in the year, and 2 hours' average daily use of total installation, 10c. for first 3 hours' average daily use, 5c. for all use above 3 hours, 5 per cent. off $500 monthly bills, 10 per cent. off $1,000 monthly bills.	16 lamps, Hamilton Fish Park. 1 lamp, foot West One Hundred and Twenty-ninth street. 1 lamp, foot West One Hundred and Thirtieth street.
												146 00	.....	.....		
	New York Edison Company	.....	102 20	.....	.....	.....	146 00	.....	146 00	.....	182 50	146 00	.....	22 50	Same as New York Edison (Bronx).	Same as U. E. L. and P. Company.
			109 50	.....	.....	.....	146 00	.....	146 00	.....	182 50	.....	.....	22 50	Same as New York Edison (Bronx).	Complete list of lamps attached to bid. Total—1,955 arcs, 50 incandescent.
	Brush Electric Illuminating Company	.....	.....	.....	.....	.....	146 00	102 20	.....	.....	.....	146 00	.....	.....		Complete list of lamps attached to bid. Total, 884.
							146 00	.....	.....	.....	.....	146 00	.....	.....		4A Special lamps are at Schoolship "St. Mary's" (4 lamps).
	New York Edison Company	.....	.....	.....	.....	.....	146 00	.....	.....	.....	.....	146 00	.....	25 00	15c. first and second hrs.' average daily use. 10c. third and fourth hrs.' average daily use. 5c. above 4 hours' average daily use. Otherwise same as U. E. L. and P. Company.	Complete list of lamps attached to bid. Total—1,047 arcs, 354 incandescent.
							146 00	.....	.....	.....	.....	146 00	.....	25 00		
Bronx	Bronx Gas and Electric Company	.....	.....	.....	.....	125 00	.....	.....	.....	146 00	.....	.....	.....	.....	Same as 1903.	
															10c.	650 arcs (list attached) in Westchester, except Williamsbridge.
	Westchester Lighting Company	.....	.....	.....	.....	125 00	.....	.....	.....	.....	.....	.....	.....	19 50	1c. per hour for each 16 c. p. lamp.	Bid for these is from March 28 to December 31; for excess over 650, for full year.
										146 00	.....	.....	.....	25 00	15c.	City Island, Pelham Bay Park, territory between City line and same, Williamsbridge and Wakefield.
										146 00	.....	.....	.....	25 00	15c.	
Brooklyn	Edison Electric Illuminating Company of Brooklyn	62 05	.....	124 50	124 50	124 50	.....	.....	.....	.....	.....	.....	.....	.....	14c. Otherwise same as U. E. L. and P. Company.	Generally throughout Borough of Brooklyn. Bid of $124.50 in each case is providing the total number of 1,200 c. p. lamps furnished under this contract is not less than 4,100 such lights; for any less number of such lights, $127.75.
		62 50	.....	124 10	124 10	124 10	.....	.....	.....	.....	.....	.....	.....	.....	Same as New York Edison (Bronx).	34c. for each 1,200 c. p. light and 17c. for each 600 c. p. light for 4,250 or more lights; for any less number of lights, 35c. for each 1,200 c. p., and 18c. for each 600 c. p.
	Flatbush Gas Company	.....	.....	116 80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10c.	Arcs on Ocean parkway, south of Foster avenue.
				116 80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		Buildings in Twenty-ninth Ward.
	New York and Queens Electric Light and Power Company	.....	.....	.....	.....	.....	.....	.....	.....	124 10	.....	.....	.....	25 00	15c., First, Second, Third and Fourth Wards. 20c., Fifth Ward.	Company will furnish free lights where required by franchise. $124.10 is for 1,880 lamps or more; $127.75 if the number of lamps shall be less than 1,880 and more than 1,800; $131.50 if the number shall be 1,800 or less. Company to furnish free lights where required by franchise.
Queens										120 45 In Wards 1 to 4.	.....	.....	.....	25 00	15c., First, Second, Third and Fourth Wards. 20c., Fifth Ward.	In Wards 1 to 4, 33c. per lamp per night for 1,650 lamps or more, and 34c. per lamp per night if the number shall be less than 1,650 and more than 1,549, and 35c. per lamp per night if the number shall be less than 1,550, with such free lamps as the company's franchises provide for in such wards.
										124 10 In Ward 5.	.....	.....	.....	.....		In Ward 5, 34c. per lamp per night for 160 lamps or more, and 35c. per lamp per night if the number shall be less than 160 and more than 139, and 36c. per lamp per night if the number shall be less than 140.
Richmond	Richmond Light and Railroad Company	.....	.....	.....	.....	125 00	.....	.....	.....	.....	.....	.....	5 00	25 00	15c.	The price as above specified is quoted upon the basis of 567 arc lamps or more, similar to those now in use by said company in the Borough of Richmond. In case the number of said arc lamps shall be reduced by order of The City of New York below 560, each lamp furnished below said number shall be charged for at the rate of $128.65 per annum. The price for incandescent lamps as above specified is quoted upon the basis of 3,588 or more, similar to those now in use by said company in the Borough of Richmond. In case the number of said incandescent lamps shall be reduced by order of The City of New York below 3,550, each lamp furnished below said number shall be charged for at the rate of $27 per annum. Complete list of lights attached to bid.
	New York and Staten Island Electric Company	.....	.....	.....	.....	124 10	.....	.....	.....	.....	.....	.....	5 00	25 00	15c.	On the basis of 475 arc lamps or more, similar to those now used in Richmond Borough, the sum of 34c. each per night; for any lesser number than 475 arc lamps as above, the sum of 35c. each per night. On the basis of 3,500 incandescent lamps or more, similar to those now used in Richmond Borough, the sum of $25 each per year; for any lesser number than 3,500 incandescent lamps as above, the sum of $25.50 each per year.

TABLE OF PRICES.

16c.	per	night	$58 40	per year.
17c.	"	"	62 05	" "
18c.	"	"	65 70	" "
30c.	"	"	109 50	" "
32c.	"	"	116 80	" "
33c.	"	"	120 45	" "
34c.	"	"	124 10	" "
35c.	"	"	127 75	" "
36c.	"	"	131 40	" "
40c.	"	"	146 00	" "
50c.	"	"	182 50	" "

Department of Water Supply, Gas and Electricity,
Commissioner's Office, Nos. 13-21 Park Row,
City of New York, March 9, 1903.

Hon. ROBERT GRIER MONROE, Commissioner of Water Supply, Gas and Electricity, New York:

Dear Sir—In response to your request I would herewith report on the existing condition of the lighting of The City of New York, in regard to the prices charged for same, as well as the contracts between the City and the electric and gas companies for the lighting of the said City during the ensuing year. This report applies to the boroughs of Manhattan and The Bronx, referring slightly to the boroughs of Richmond, Queens and Brooklyn.

Condition of Lighting.

The City of New York outside of the central ridge of the island in the Borough of Manhattan is badly lighted, old style open flame gas burners being used largely on the east and west sides, and even in a number of residential districts in the central portion. All these lamps should be changed to mantle burners. The Borough of The Bronx is growing so rapidly that the present systems of lighting are inadequate and the results unsatisfactory, as you can see by the complaints coming into this office continually. The Borough of Richmond is also poorly lighted, and should be given considerable attention. Up to date the system of inspection in all of these boroughs has been inadequate on account of lack of men. The present system of repairs to gas lamps is expensive and should be changed, as is shown later.

Prices Paid.

Electric Lights—

The Borough of Manhattan pays the following prices for electric lighting:

	Per Year.
Open series arc lamps, 2,000 candle power, 425 watts consumption.....	$146 00
Enclosed arc lamps, direct current, low tension, 2,000 candle power, 425 watts consumption.....	146 00
Enclosed arc lamps, 2,000 candle power, alternating current, 450 watts consumption	146 00
Enclosed arc lamps, 900 candle power, 230 watts consumption.....	102 20
Double arc lamps, each 900 candle power.....	182 50

The prices are about the same in the Borough of The Bronx and in Richmond, except that they use the 1,200 candle power lamp in some instances, which is charged as follows:

	Per Year.
Enclosed arc lamp, 1,200 candle power, 320 watts consumption.....	$125 00

This same lamp is charged at $124.50 in Brooklyn and $116.80 in the section of Flatbush.

Gas Lights—

For gas in New York we pay $17.50 per year per lamp supposedly of 22 candle power and burned in an open-flame burner. This is the price charged by the Consolidated Gas Company. The Standard Gas Light Company, where its mains extend, charges $13.04 1-3 per lamp per year for presumably 20 candle power gas. The New Amsterdam Gas Company charges $12 per lamp per year for presumably 25 candle power gas, these prices being limited to these amounts by the latter companies' charters. In other parts of Greater New York, the candle power varying from 20 to 25, the bids are $16, $22, $24 and $25. For mantle burners in the Borough of Manhattan the Consolidated Gas Company charges for a single mantle burner $29 per year, nominally 60 candle power; for a double burner, $47. Other boroughs must pay $30 for these lamps. The price for mantle burners includes all repairs as well as illuminant. The price for open-flame burners includes the lighting, extinguishing, cleaning, reglazing, etc., but the City furnishes a certain amount of material to the gas company for this purpose.

A classified list of gas and electric lights showing the number of each and prices paid per annum for the different lights for the last five years is given on Chart A.

Prices Paid for Lighting Public Buildings.

This Department paid for lighting public buildings last year $68,289.80. Beginning this year this Department took over the lighting of a large number of public buildings not previously included, so that this year, as closely as can be approximated, the Department will have to pay out from $300,000 to $350,000 for lighting public buildings with incandescent electric lamps and gas lamps. The price paid for this electric current is 10 15-100 cent per kilowatt hour; for gas we are charged in Manhattan at the rate of 90 cents per thousand cubic feet. The comparative cost of lighting public buildings for the past five years and the cost of lighting public buildings for the month of January, 1903, are herewith given in Table B. The reduced cost in 1899 was due to competition between the New Amsterdam and the Standard Gas Light companies on one side and the Consolidated Gas Company on the other prior to their consolidation.

Comparison and Checking of Data.

In order to compare the price that this city pays for electric and gas lighting, returns were procured from 175 cities varying in size from a city of 25,000 people to a city of over 1,600,000. This data was checked, so far as possible, in this way: Letters were written to each of the electric light companies and to each gas company in each city; also to the public officers of the city. The returns of the companies were checked with the returns of the cities, the latter being often in the form of printed reports, and these results were checked with the standard electric light and gas directories. In some cases these reports were further checked by personal consultation with city electricians and other engineers. While there may be some slight chance of error in any individual return, I do not believe that the average of these returns is wrong by one per cent. The data as received shows the number of lights, candle power, and prices paid, the price of coal, the length of term of contracts in years, methods of manufacture, and so on. The result of the returns from the first hundred cities answering were then concentrated to show the range of prices and number of lamps, and is herewith submitted on Chart C for electric lighting and on Chart D for gas lighting. We found that neither the cost of coal, number of lights or length of contract had any comparative effect on the prices paid. New York, using 4,748 arc lamps, pays $125 to $146 each. Evansville, Ind., with 300, pays $60. Wholesale use, while it cheapens the price to the private consumer, is of little benefit to cities.

Explanation of Charts.

The following explains these charts. Out of the hundred cities we find that eight of them have municipal plants, of which three use 1,200 candle power lamps and six use 2,000 candle power lamps. Jacksonville, Fla., is in both classes, using both types of lamps. Ninety-one cities buy light from private companies. Of these twenty-three use 1,200 candle power lamps and sixty-eight use 2,000 candle power lamps. On Chart C, from left to right, the first short section shows the range of prices and number of lamps in the three municipal cities using 1,200 candle power lamps. The next short section shows the range of prices and number of lamps in six municipal cities using 2,000 candle power lamps. The next section, a little longer, shows twenty-three cities using 1,200 candle power lamps and purchasing light from private companies. The next section on the right shows the range of prices and number of lamps of sixty-eight cities using 2,000 candle power lamps, purchasing light from private companies. Two curves are represented in each of these sections, the continuous rising curve being the price curve, and the serrated line showing the number of lamps. The names of the cities and the number of lights they use, with price paid, are also given in figures on the bottom of the sheet. The line of stars across the top of the sheet shows the relative position of the prices The City of New York pays for the same class of light. Chart D shows the range of prices of gas and number of gas lamps in the same manner as given above. The reason for this chart being so much smaller than Chart C is that out of the one hundred cities only thirty-four use gas for city lights in a way that permits intelligent comparison with New York.

Average Prices.

Electric Lamps—

The sixty-eight cities using 2,000 candle power lamps, purchasing from private companies, pay an average price of $88.60, the lowest being Evansville, Ind., which pays $60, and the highest being Haverhill, Mass., paying $125 per lamp per year. New York pays $146 per lamp per year for its 2,000 candle power lamps.

The twenty-three cities burning 1,200 candle power lamps pay an average price of $81.08, the lowest being the City of Duluth, which pays $55, and the highest being the City of Yonkers, paying $109.50 per lamp per year. The bid to The City of New York this year for equivalent lights is $125 per lamp per year.

The six cities operating their own municipal plants, burning 2,000 candle power lamps, pay an average price of $66.45 per lamp per year, the lowest being paid by the City of Columbus, Ohio, $47 per lamp per year, and the highest, Jacksonville, Fla., $90. It must be remarked, however, that Jacksonville, Fla., sells its lights to the city at a profit, and at the end of the year pays back to the city the amount over its operating expenses. The City of New York pays $146 per lamp per year for the same service.

The three cities using 1,200 candle power lamps and having their own municipal plants pay an average of $56.84 per lamp per year, the lowest being Jamestown, N. Y., $48, and the highest, the City of Grand Rapids, Mich., paying $68.54. The City of New York pays $125 per lamp per year for the same service.

Average Prices in Lighting Public Buildings—

The one hundred cities gave us general returns on the cost of lighting public buildings. We find the average price for electric current per kilowatt hour is 10.6 cents; for gas per thousand cubic feet the cost is $1.10. In municipal plants these lights are often given to the city free, and included in the cost of arc lighting, but in other instances cost the city about an average of 3 cents per kilowatt hour for electric light.

Gas Lamps—

Chart D, showing gas statistics, is in two sections, the one at the left showing the price of open flame gas burners and the number of burners used. New York is well up on this list, it paying for the greater bulk, 14,460, of its open flame gas lamps, $17.50 for gas and maintenance, plus 69 cents each for repairs, this being the average cost of repairs for the last five years. The city paying the lowest price is Wilmington, Del., which pays $13.80 per lamp per year, when compared with the New York standard, and the highest being New Haven, Conn., which pays $22. The average of these prices for ten cities is $19.52 per lamp per year, including repairs. The City of New York pays $18.19 for the same service. The section on the right of Chart D shows the price and number of lamps with mantle burners. New York is next to the top of this list at $29, and in some boroughs pays $30. The lowest in cost of these cities is the City of Chicago, which pays $18.55, this being secured by purchasing its gas and making its own repairs and maintenance, the highest price, $31, being paid by the City of Binghamton, N. Y. The average of these prices for twenty-two cities is $27.20 per lamp per year. All averages in gas and electric figures exclude New York.

All the cities given above purchase their gas from private companies, the saving lying mainly in repairs and maintenance. You will note that if we had the New Amsterdam prices all over the City we could equal Chicago by maintaining our own gas lamps, but on the New Amsterdam lines we have only 2,981 lamps.

Underground Conduits.

It is often stated that the high price paid by The City of New York for electric lighting is due largely to the charge for underground conduits, but in the Borough of the Bronx, where there are but few underground conduits, the New York Edison Company, the Bronx Gas and Electric Company and the Westchester Lighting Company all charge $146 per year for 2,000 candle power lamps, the same as in the Borough of Manhattan, where there are underground wires. In looking up this matter we meet a curious condition of affairs. In 1901 the City of Chicago in its report stated that it cost $219 per arc lamp for subway transmission. In 1902 it revised this figure and said that the cost was about $175. The City of Detroit built its conduits for $1,716 for a mile of single duct three and one-half inches in diameter. It rents to any customer a single duct on its underground system for $264 per mile per year, with a discount of from ten to twenty per cent. if more ducts are taken. The City of Cincinnati paid $12 per lamp per year more for underground lights than for overhead lights, and it will be noticed that this is six per cent. interest on a $200 cost of construction. Milwaukee allows $18 per year for the same thing. This is six per cent. on a $300 cost of construction.

In view of the prices given above, the statement that the New York Edison Company, which is one of the Consolidated Companies, pays the Subway Company, another of the Consolidated Companies, $900 per mile per year for a three-inch duct seems to be very extraordinary, and it looks as though a large profit were paid from one pocket to the other pocket of the same concern. This statement gives, if not analyzed, an apparent reason why the lighting company should receive a higher price for lighting the City because it has to pay a high price to the Subway Company, although each company works for the same interest.

Free Conduits.

Ordinarily it would seem proper to allow a difference between underground and overhead lights, but this City can compel the Subway Company to give them free conduits, and if they haven't enough room to accommodate the present or future requirements the City can compel them to build same free of cost. In these figures therefore no allowance is made.

Present Bidders for Lighting.

With reference to the bidders for the lighting business of The City of New York the history of the different companies shows a series of consolidations which created a community of interest in all the boroughs of the City, particularly so in the boroughs of Manhattan and The Bronx. Any bids we may receive will undoubtedly come from the same source, and will represent this community of interest by a division of territory or by a scaling of bids. This information can be readily obtained by reference to the various gas and electric light directories, Manual of Statistics, and records of the various investigations by commissions so far conducted in the affairs of lighting this City.

Resume of Existing Conditions.

A resume of the above facts shows:

1. That this City is a very large consumer of electric current for electric lighting of all kinds and of gas for gas lighting.
2. That the price it pays is very high, and at these prices sufficient money can hardly be allotted to this Department to keep pace with the growth of the City.
3. That it pays higher prices apparently for electric arc lighting than any other city in this country under equivalent circumstances. That it pays a high price for gas, for maintenance service from gas companies, and almost the highest price for mantle lighting.
4. It has no possible source of relief through competition now, nor can it expect to get any relief from future competition except of the most temporary character. In some way, however, it must meet the demands of its citizens and at the same time protect itself from such flagrant overcharges as have been shown.

Relief Possible.

There seem to be only two possible sources of relief. The first is such publicity and agitation as will force a reduction in prices by the present bidders. This is improbable and might be only temporary, although the increased business to the producers of electric current and gas would very soon make up for the decreased price per light.

A second method of relief is that this City take the advantage taken in a number of instances by other cities similarly situated and build and operate its own plant. This is what is known as municipal ownership. We do not pretend to regard municipal ownership as a cure-all under all circumstances, but, as is shown further on, this City is in such a position that it can build a plant cheaply on account of free conduits, and, even if it operates it expensively, the price per light will still be far below the prices it pays at present. In endeavoring to show this, details are given of the status of affairs in Chicago, Detroit, Allegheny and Jacksonville, which are the most noticeable of the eight cities reported to us.

Some Results of Municipal Ownership.

Chicago, Ill.—

The City of Chicago states in its last report, the advanced sheets of which you have, that it costs $53.51 to produce a 2,000 candle power arc light running all night and every night, and in this charge it includes all that it deems necessary in the way of new material and repairs to keep its plant to date. It does not, therefore, charge depreciation, for its theory, if carried far enough, wll cover depreciation. In the last sixteen years of operation it has expended the sum of $3,400,663.05 for lighting the city and for building its own plant, whereas if it had purchased from private companies during that period at prevailing prices it would have cost $3,535,875.50 and it would not have a plant. It has issued no bonds and it owes nothing on its plant, which cost to date $1,684,000. Whether Chicago states the price of lighting properly or not could hardly be taken as an argument against the conditions in this City. If it doubled its price it would still be nearly $40 per lamp below New York. No matter what method of bookkeeping is applied to it, it owns to-day its own plant, which is operating satisfactorily and, so far as is known, is furnishing satisfactory light. In addition to the cost of its plant Chicago has also built and mantains quite an amount of underground conduits. This expense we would not have. As you have noted, Chicago operates 4,640 arc lamps. It would be apparently safe to assume, then, that New York could build a plant for at least the price Chicago built hers which would furnish the present number of arc lamps—4,748. If New York could produce light as cheaply as Chicago it could build its own plant out of the price it now pays. This is just what Chicago did. It paid for its plant from what it would have paid other companies to light the city, besides doing its own lighting.

Detroit, Mich.—

In Detroit, when its plant was built, it issued $650,000 in bonds, and they have spent since then, including some replacements, renewals and considerable subway construction, $932,232. The difference between the bond issue and the total investment is taken care of by direct taxation, the bond issue is taken care of from the general sinking fund, so that Detroit does not make quite as favorable a showing as Chicago, but in ten years of its existence before building the municipal plant, from 1885 to 1894, inclusive, Detroit paid an average price per lamp of $177.27, with an average number of lamps of 803. The lowest price during this period was $128.87 in 1893, in which year it used 1,279 lamps. It paid for the year ending June 30, 1902, according to its own statements, $63.82 for a 2,000 candle power lamp burning all night and every night. In other words, it is now furnishing 2,035 lamps at a total cost of $129,873.70, where previously it was getting an average of 803 lamps for a total price of $142,347. When this is taken into consideration it would show that Detroit has paid to date to the city a considerable sum of money to apply on the cost of its plant. The statement that Detroit produces a light for $63.82 per year is strongly criticized, particularly in the Electrical World and Engineer of February 28 of this year. This paper states that the lights cost Detroit $80 per year, the principal difference being on the question of the proper rate to charge for depreciation. Let us suppose the Electrical World is entirely correct. The City of New York pays $146, and if it could get a light for $80 per year it would save very large sums of money. Detroit furnishes its public buildings with light at a cost of 3.7 cents per kilowatt hour. Chicago practically furnishes some of its buildings with light free.

Allegheny, Pa.—

Allegheny has a municipal plant which furnishes 1,414 2,000 candle power arc lamps at the rate of $74.29 per lamp per year. It furnishes its public buildings with light at 2.74 cents per kilowatt hour. It issued $260,000 in bonds to build its plant, but has since paid into a sinking fund to retire these bonds over $82,000. The information is not given as to what the price was that Allegheny had to pay before it built its municipal plant, but if this were taken into consideration, as in the case of Detroit, we have no doubt it would show approximately the same result, for the City of Pittsburg, immediately across the river from Allegheny, pays $96 per year for its arc lamps.

Jacksonville, Fla.—

The City of Jacksonville, while it is shown in the curves on Chart C, like any other municipal plant, has a method of operating and financing which differs from the others materially. It operates its plant as an electric light company would, and it charges the city profitable prices for arc lighting and for lighting its public buildings. It also supplies private consumers and charges them profitable prices. At the end of the year, after taking out their reserve fund, interest and other proper charges, it pays the balance of its profits back into the Treasury of the city to apply on taxes. Last year it paid the city about $22,000. It charged the city $90 a year for a 2,000 candle power arc lamp, and it charged public buildings seven cents per kilowatt hour. You will see, therefore, that these prices on the chart should be corrected, as they include profit. The other municipal towns charge what they deem actual cost.

Cost of Municipal Plants.

In order to show the cost of building these plants I would submit the following table:

Name of City	Cost of Plant.	Number of Lights Operated.	Cost to Build per Light Operated.
Jamestown, N. Y.	$95,000 00	338	$281 00
Jacksonville, Fla. (This includes cost of commercial lighting plant as well.)	228,723 79	371	616 50
Grand Rapids, Mich.	194,721 65	529	368 00
Columbus, Ohio	Not given.	320	.....
Chicago, Ill. (Includes subway construction.)	1,684,000 00	4,640	363 00
Detroit, Mich. (Includes subway construction and incandescent plant.)	932,232 20	2,133	437 00
St. Joseph, Mo.	103,000 00	421	244 00
Allegheny, Pa.	327,944 43	1,414	232 00

Arguments Against Municipal Ownership.

Referring to some of the arguments against municipal plants, it is a curious fact that the interest account, depreciation account and taxes are among the items particularly attacked by those in favor of private ownership. It will be noted that the accounts of municipal plants are open to examination and criticism of all kinds, but we have yet to see outside of the State of Massachusetts a full statement of the amounts charged up for depreciation, including replacements and renewals, interest and taxes, from the general run of electric light and gas companies in the United States. Until their books are subject to the same criticism as those of a plant owned and operated by a municipality, we have not a fair comparison between two systems; for instance, when the various companies in this City consolidated and a number of plants were abandoned, so far as we can find out no depreciation charge was made for this. On the contrary, the stock was increased. It is also stated that we may change our method of producing electric light requiring entirely new machinery on a new system, although the present type of electrical machinery operates in units of reasonable size at over 90 per cent. efficiency. If this is true, does it not equally apply to all private companies? Corruption is charged on all sides as the first result of municipal ownership. A municipal plant of any size now operating in the United States will have to meet every year the published reports of plants doing as well as Chicago, Detroit, Allegheny and Jacksonville. This, if followed carefully by the public press, will certainly govern any municipal plant to a marked extent. One of the principal arguments brought up against municipal ownership is that the City of Philadelphia has a gas plant which was given up as a failure and is now operated by a private company. Apparently no one has ever cared to state the real reason why it was given up, and we do not suppose any one ever will. Without the reasons why, the failure of Philadelphia teaches no lesson. The City of Boston is often quoted as having made a most careful examination of municipal ownership within the last few years and finally decided to buy their lights from a company; the reason is plain. The company made a contract with Boston which carries with it all the advantages of municipal ownership. In brief, after a period of two years and six months after signature, Boston had a right to establish exactly what it cost the electric light company to produce public lights, and the company was bound to aid them in every way to do this. They were then to add 7 per cent. for depreciation and 6 per cent. for interest on the cost of the plant used for public lighting. For a period of five years, the resultant price per arc lamp was to govern. Besides this, the company had to adopt any improved machinery or system. If it did not, the City could make a claim that it would only pay what lighting would cost when produced by such new system. If The City of New York had a contract of this kind, it is all we could ask. It is the essence of municipal ownership, as it makes the company practically the agent of the City.

New York's Standpoint.

From the standpoint of New York, from the data given of municipal plants above as well as from other reports which have come in too late to be charted, the fact remains that these municipal plants under similar circumstances have saved their respective cities large sums of money represented either in plants or decreased cost of lighting. and that even were their prices raised in reason this City could at the raised prices either save a large amount of money every year or devote the saving to lighting and thereby light the City properly.

Estimated Saving.

The following statement shows approximate savings: New York now uses

3,876 2,000-candle power arc lamps at $146 per year	$565,896 00	
872 900-1,200-candle power arc lamps at from $102.20 to $182.50 per year	120,480 00	
Present cost		$686,376 00
At average prices of other plants:		
$88.60 for 2,000 candle-power lamps, $81.08 for 1,200 candle-power lamps would cost		414,115 00
Saving at these prices per year		$272,261 00
Present cost brought down	$686,376 00	
At municipal plant prices:		
3,876 2,000 candle-power arc lamps at $66.45, 872 900-1,200 candle-power arc lamps at $56.84, would cost	307,124 00	
Saving per year		$379,252 00
Public building lighting now costs:		
Approximated for 1903 at 10.15 cents per kilowatt hour	$383,317 00	
On basis of 3 cents per kilowatt hour, as shown by municipal plants, would cost	113,324 00	
Saving at this per year would be		269,938 00
We pay now for open-flame gas burners and mantle gas burners per year	$505,420 00	
If we change from open flame lamps to mantles and operate on the same basis as the City of Chicago, it would cost	464,036 00	
Saving over our present cost		41,384 00
A total saving on a municipal basis of		$690,574 00
Or if we operate at the average price of other cities not having municipal plants with public building lighting calculated on present rates, the saving would be		$293,833 00

In deriving the saving in gas lamps we arrived at it in this manner: In changing the open flame gas lamps to mantle lamps we would possibly save 10 per cent. in number. We now have 21,187 open flame lamps; 10 per cent. from this leaves 19,069, which we would have on a mantle basis. We have now 5,581 mantle lamps, making a total of 24,650. We pay for these at present from $29 to $30, depending on the locality; say $29. The cost then per year for all mantle lamps at present prices would be $726,323 per year. Taking the same number of lamps at Chicago prices, which is $18.55 per mantle lamp per annum, the result in cost would be $464,036, a saving of $262,287 per annum over present prices. But we do not use all mantle lamps now. We pay for open flame lamps $332,098 per year; for mantle lamps, $173,322 per year, a total of $505,420. If we change to all mantle lamps and obtain Chicago's prices it would cost us $464,036, a saving over present conditions and prices of $41,384 per annum.

Chicago's prices are derived as follows: They buy their gas from the gas company for $12 per lamp per annum; they pay $3.65 for lighting, cleaning and extinguishing. They pay fifty cents per annum for repairs, and they pay $2.40 per annum for repairs due to mantle lighting, a total of $18.55.

Conclusions.

From the above statements it appears the conclusions to be drawn are:

(1) New York should receive much lower prices than it does.

(2) That it would be very profitable for it to operate its own electric plant—one capable of furnishing all its arc lights and all incandescent lights necessary for public lighting.

(3) To reduce its number of gas lamps by increasing electric arcs at the lower prices obtained; change all its open flame lamps to mantle burners and maintain them itself or through contracts with private parties for repairs, etc.

(4) It would also seem advisable that its present bids for lighting for the year be rejected and new bids taken under revised contracts, which will give it at least a chance to save in mantle gas lights, this having been demonstrated as possible under existing circumstances. In electric lighting it should be given more authority to enforce penalties for outages or other neglect.

All of which is respectfully submitted,

(Signed) C. F. LACOMBE, Engineer of Surface Construction.

CHART C

Showing prices paid and number of lamps used in the Electric Arc lighting of the Cities named

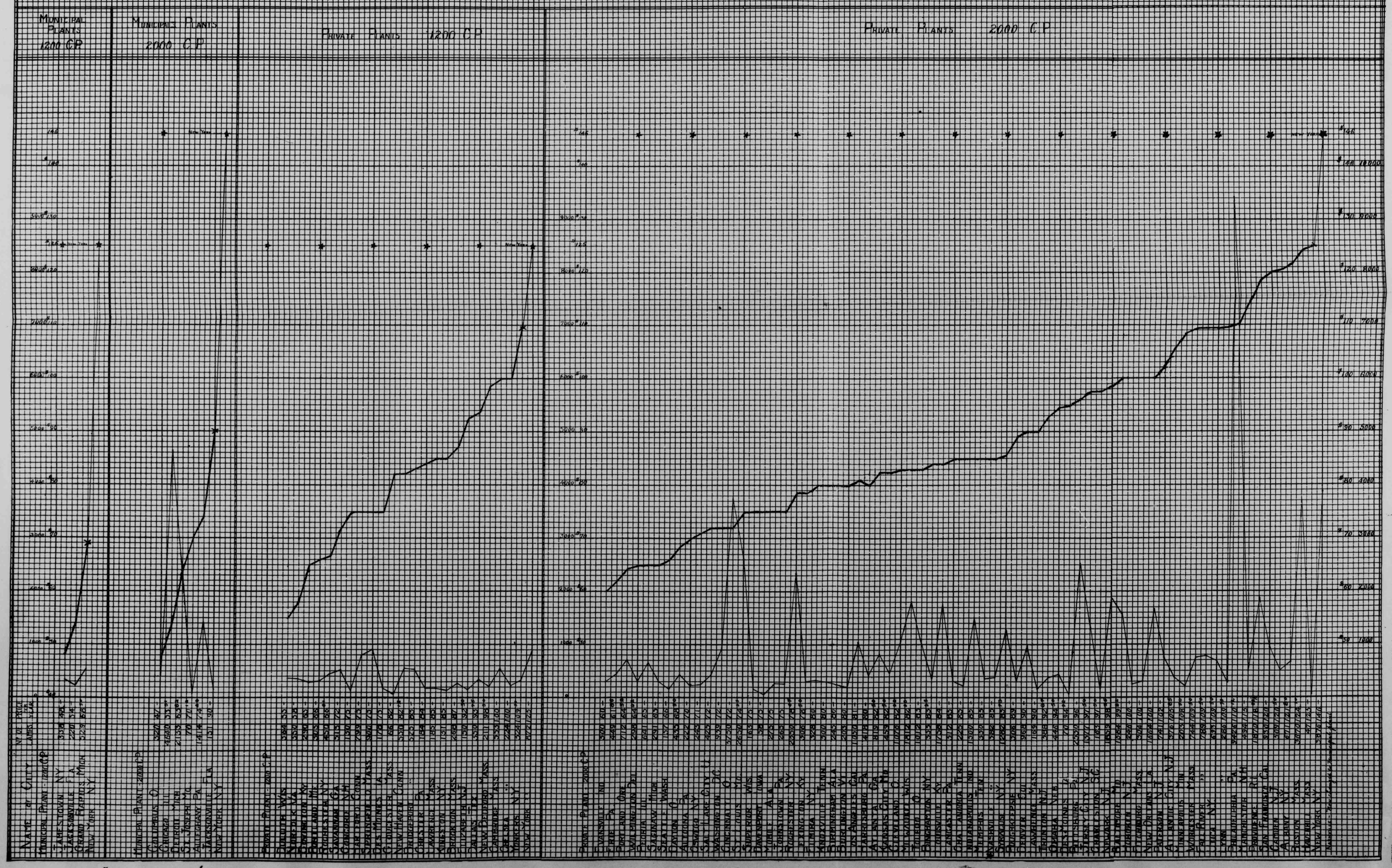
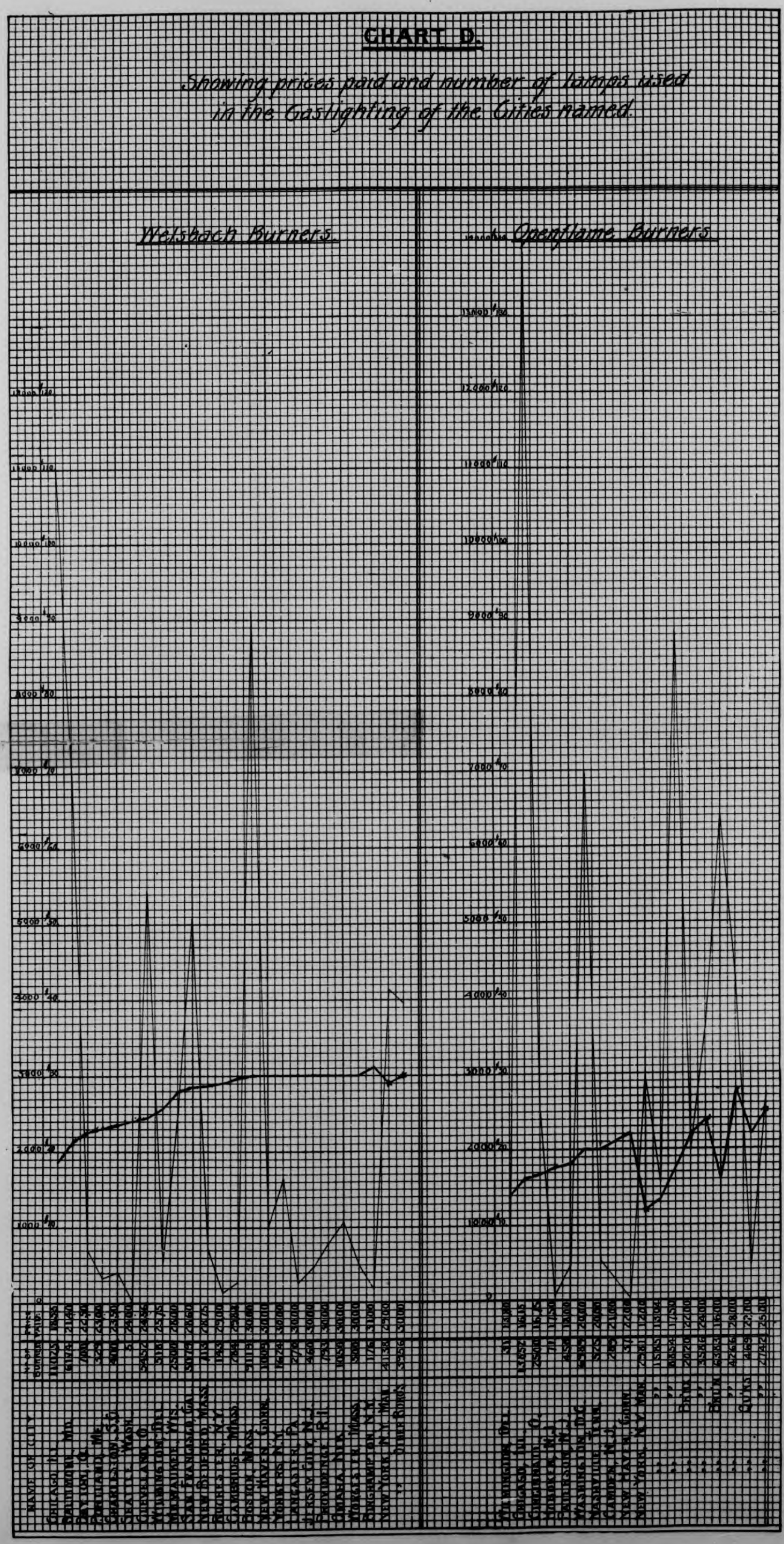


CHART D.

Showing prices paid and number of lamps used in the Gaslighting of the Cities named.



Name of City	Population	Price	Number of Lamps	Price	Number of Lamps
Baltimore, Md.	508,957	$21.00	24,000	$16.45	13,000
Chicago, Ill.	1,698,575	24.00	30,000	18.00	27,000
Cincinnati, O.	296,908	24.00	7,000	18.00	4,000
Cleveland, O.	261,353	24.00	7,000	18.00	4,000
Detroit, Mich.	285,704	24.00	7,000	18.00	4,000
Indianapolis, Ind.	169,164	24.00	5,000	18.00	3,000
Kansas City, Mo.	163,752	24.00	5,000	18.00	3,000
Milwaukee, Wis.	285,315	24.00	7,000	18.00	4,000
Minneapolis, Minn.	202,718	24.00	6,000	18.00	3,000
Newark, N.J.	246,070	24.00	6,000	18.00	3,000
New Haven, Conn.	108,027	24.00	3,000	18.00	2,000
New York, N.Y. Man.	2,050,600	24.00	30,000	18.00	27,000
Omaha, Neb.	140,452	24.00	4,000	18.00	2,000
Philadelphia, Pa.	1,293,697	24.00	30,000	18.00	27,000
Pittsburgh, Pa.	321,616	24.00	8,000	18.00	5,000
Providence, R.I.	175,597	24.00	5,000	18.00	3,000
Rochester, N.Y.	162,608	24.00	4,000	18.00	2,000
San Francisco, Cal.	342,782	24.00	8,000	18.00	5,000
Scranton, Pa.	102,026	24.00	3,000	18.00	2,000
Syracuse, N.Y.	108,374	24.00	3,000	18.00	2,000
Washington, D.C.	331,069	24.00	8,000	18.00	5,000
Worcester, Mass.	118,421	24.00	3,000	18.00	2,000
Other Towns		24.00	27,000	18.00	17,000
Total			240,000		160,000

CHART "A."

Classified List of Kinds of Lamps, Number and Prices, With Totals.

	Lamps, Dec. 31, 1898.	Cost 1898.	Lamps 1899.	Cost 1899.	Lamps 1900.	Cost 1900.	Lamps 1901.	Cost 1901.	Lamps 1902.	Cost 1902.
A.—Ordinary Burners:										
Consolidated Gas Company.....	10,879	.....	10,375	.....	9,476	.....	9,234	.....	8,854	.....
New Amsterdam Gas Company....	3,433	.....	3,410	.....	3,079	.....	3,058	.....	2,981	.....
Standard Gas Company.....	1,909	.....	1,910	.....	1,786	.....	1,773	.....	1,585	.....
Central Union Gas Company.....	1,630	.....	1,817	.....	1,863	.....	1,957	.....	2,020	.....
Northern Union Gas Company.....	2,836	.....	2,934	.....	2,904	.....	2,958	.....	3,226	.....
Westchester Lighting Company....	735	.....	741	.....	347	.....	345	.....	360	.....
	21,422	$431,983 31	21,187	$385,691 75	19,455	$368,160 09	19,325	$356,352 02	19,026	$332,098 75
B.—Welsbach, Gas:										
Consolidated Gas Company.....	3,632	.....	4,026	.....	4,170	.....	4,261	.....	4,728	.....
Welsbach, Naphtha:										
Welsbach Street Lighting Company	387	.....	449	.....	741	.....	760	.....	853	.....
	4,019	$44,405 14	4,475	$139,867 00	4,911	$149,192 91	5,021	$157,075 52	5,581	$171,159 00
C.—Ordinary Naphtha:										
New York and New Jersey Globe Gas Lighting Company.....	1,415	23,704 90	1,583	34,609 60	1,519	33,635 78	1,623	34,012 98	1,474 Excludes Incandescent Lamps.	34,007 75
D.—Electric Lamps:										
Brush Electric Illuminating Company	863	.....	879	.....	896	.....	880	.....	877	.....
New York Edison Company, Manhattan	1,816	.....	1,874	.....	1,954	.....	1,954	.....	1,954	.....
United Electric Light and Power Company	.....	.....	.....	.....	.....	.....	16	.....	18	.....
Bronx Gas and Electric Company..	496	.....	573	.....	615	.....	621	.....	650	.....
New York Edison Company.....	962	.....	980	.....	1,337	.....	1,338	.....	1,022	.....
Westchester Lighting Company....	86	.....	86	.....	86	.....	125	.....	227	.....
Eastchester Electric Company.....	68	.....	68	.....	.....	.....	.....	.....	.....	.....
Total.....	4,291	$619,720 87	4,460	$646,744 21	4,888	$667,033 93	4,934	$673,476 85	4,748	$676,466 74
Total.....	31,147	$1,119,814 22	31,705	$1,206,912 56	30,773	$1,218,022 71	30,903	$1,220,917 37	30,829	$1,213,732 24

CHART "B."

Comparative Cost of Lighting Public Buildings, Etc., Manhattan and The Bronx.

	1898.	1899.	1900.	1901.	1902.
Gas to Public Offices, Markets, etc..	$25,315 00	$15,063 01	$21,624 16	$22,374 47	$24,311 65
Electric lighting Public Offices....	5,352 77	7,276 79	9,469 80	7,809 42	9,821 57
Gas to Armories.....	20,325 91	11,726 77	19,264 46	19,908 18	17,224 20
Electric lighting Armories.....	11,750 36	11,885 53	13,601 13	14,835 14	16,932 38
Total.....	$62,744 04	$45,952 10	$63,959 55	$64,927 21	$68,289 80

In 1898 the price per 1,000 cubic feet for gas was 97½ cents.
In 1899 the price per 1,000 cubic feet for gas, January to May 22, was 95 cents.
In 1899 the price per 1,000 cubic feet for gas, May 22 to December 31, was 45 and 50 cents.
In 1900 the price per 1,000 cubic feet for gas was 92½ cents.
In 1901 and 1902 the price per 1,000 cubic feet for gas was 90 cents.

Cost of Lighting Public Buildings, Etc., of Other Departments During the Month of January, 1903, Manhattan and The Bronx.

	Totals.	Electric.	Gas.
Board of Education.....	$19,912 39	$11,775 04	$8,137 35
Fire Department	2,411 48	526 34	1,885 14
Police Department	3,125 31	863 89	2,261 42
Charities Department	2,154 15	355 26	1,798 89
Corrections Department	2,594 31	1,295 48	1,298 83
Health Department	845 83	537 58	308 25
Park Department	412 14	97 35	314 79
Bellevue and Allied Hospitals.....	2,254 38	900 83	1,353 55
Street Cleaning Department.....	1,128 22	156 31	971 91
President Borough of Manhattan.....	241 41	212 70	28 71
Total.....	$35,079 62	$16,720 78	$18,358 84
Gas to Public Buildings.....	2,383 83	.....	2,383 83
Gas to Armories.....	2,225 70	.....	2,225 70
Electric current—Buildings	799 86	799 86	.....
Electric current—Armories	2,112 45	2,112 45	.....
Total.....	$42,601 46	$19,633 09	$22,968 37

"VI."

Report of a Committee of the Board of Estimate and Apportionment on Public Lighting.

At the meeting of the Board of Estimate and Apportionment on December 4, 1903, the Mayor presented the following report of the Committee to whom was referred the question of public lighting:

To the Board of Estimate and Apportionment:

Gentlemen—On March 14, 1903, the Commissioner of Water Supply, Gas and Electricity transmitted to the Board of Estimate and Apportionment a summary of the bids received for public lighting for the current year, with corresponding prices for the year 1902. The Commissioner also forwarded a report prepared by Charles F. Lacombe, Engineer of Surface Construction, which report contained a statement of prices in other cities for gas and electric lighting, with charts clearly indicating the comparative cost.

Contracts for City lighting are made under section 530 of the Charter. This section provides that bids shall be prepared and advertised for and contracts executed in the manner "prescribed for," as to other contracts entered into by the City or the departments thereof and shall be made for a term of not exceeding one year. The proposals issued to all bidders also contained the following provisions:

"The Commissioner reserves the right to reject any or all bids or estimates if the Board of Estimate and Apportionment shall determine it to be for the public interest of the City so to do."

Attention was called to the fact that the lighting interests had so united that competition in no single district of the City was possible, and the Commissioner recommended that all the bids be rejected. As there could be no actual competition, it was suggested that section 530 of the Charter be amended so as to allow lighting contracts approved by the Board of Estimate and Apportionment to be made without public letting. It was also thought that more favorable contracts could be made if the terms of such contracts were extended, and a bill amending section 530 of the Charter in these particulars was submitted to the Legislature, but no action was taken upon it by that body.

Your Board was further of the opinion that effort should be made to place the City in a better position to protect itself from overcharges for electric lighting, and the Mayor was instructed to have prepared and submitted to the Legislature a bill authorizing the installation of a municipal electric lighting plant for lighting the streets and public buildings. This bill was also submitted to the Legislature, where it was strongly opposed by the Consolidated Gas Company and defeated during the closing days of the session. In the meantime, Cary T. Hutchinson, Consulting Electrical Engineer, had prepared an estimate of the cost of building and operating an electric light plant for public lighting in the Boroughs of Manhattan and The Bronx. This estimate, which you have already seen, shows that, excluding the factor of subway rental, the City could erect and operate a municipal plant and provide arc lamps at less than fifty per cent. of the prices bid by the Edison Company. Subway rental is excluded from this estimate, because it appears that under the contract with the Consolidated Telegraph and Electrical Subway Company the City has a right to subway space free of charge.

After the Legislature had adjourned, favorable action for the relief of the City having been refused, the Commissioner of Water Supply, Gas and Electricity again communicated with you and again recommended that all bids for public lighting for the current year be rejected. In the discussion which followed this recommendation the statement was made that the Consolidated Gas Company, the dominant company interested in lighting, was also interested in a number of other matters requiring adjustment with the City, and at the suggestion of the Mayor, all questions between the City and the lighting companies were referred to the Mayor, the Comptroller and President of the Board of Aldermen as a committee of your Board.

The first matter of importance considered by us as such committee was in connection with the erection of new gas works by the Consolidated Gas Company in Astoria, and the construction of another tunnel under the East River. The completion of these works and this tunnel would, the company claimed, allow it to remove all gas manufacture from the Borough of Manhattan. With this same object in view, the company, through its subsidiary (the East River Gas Company) had secured the passage of certain legislation amending the legislative franchise of the latter company (laws of 1892, chapter 338), but materially extending the franchise rights of that company in Long Island City. The Mayor vetoed the bill on the grounds that sufficient compensation to the City had not been provided for, and that the Charter furnished the proper machinery for acquiring a municipal franchise. At this time the East River Gas Company did not show a clear title to the original Long Island City franchise under which it claimed to be operating. For this reason the City authorities could not issue the permits requisite for the laying of big feeder mains from Astoria to the present tunnel, and the claim was made that the work of removal from Manhattan was thereby delayed. The flaw in title was, however, obviated by an application to the Supreme Court for a mandamus, which was granted, and as the Corporation Counsel acquiesced in the decision and did not appeal, permits were issued, and the preparations for removal are under way. Proceedings have been completed for the closing of certain streets in Astoria, as requested by the company, and negotiations are in progress as to the terms of payment for the use of the City property involved in the construction of the new tunnel. Every endeavor has been made to facilitate the Consolidated Gas Company in carrying out its contemplated improvement.

Your committee has had called to its attention the needs of improved gas service in certain sections of The Bronx. Questions of some difficulty as to franchises were involved, but, under the advice of the Corporation Counsel, necessary permits have been issued and we are informed that the needed work is now progressing.

As the result of a comprehensive though not exhaustive study of the franchise rights of gas companies operating in the City of New York, the Corporation Counsel is clearly of opinion that the legal status of a number of these gas companies and their obligations to the City can only be settled by application to the courts. He is also clear that by consolidation and merger of electric light companies as well as gas companies, obligations and payments to the City have been avoided or curtailed.

Our examination has, moreover, led us to inquire into the accounts of the Consolidated Telegraph and Electrical Subway Company. In Manhattan the electric light wires are practically all underground, and this fact is given as justifying the very high charge for electric lights in this Borough. The subways for these wires are owned almost entirely by the Consolidated Telegraph and Electrical Subway Company, but this company is owned by the New York Edison Company, which in turn, is owned by the Consolidated Gas Company, and the subway rights thus secured are the basis of the latter company's monopoly in the distribution and sale of electric current on Manhattan Island. The agreements of 1886 and 1887, under which the subways were constructed, provide for equal rights in the subways for all electric lighting companies, but to-day the attempt of an independent company, not controlled by the Consolidated Gas Company, to extend its conductors already laid in the streets is being contested, though the City authorities have recognized the validity of the company's franchise and have issued a permit to it to place its conductors underground.

Those agreements of 1886 and 1887 also provide that the City shall receive from the Consolidated Telegraph and Electrical Subway Company each year all of its profits over ten per cent. of the actual cost of construction and operation, and the City is allowed to buy the subways on paying the actual cost, plus ten per cent. Nothing has ever been paid to the City under these agreements, the company claiming that it has never earned more than ten per cent. of the actual cost of construction.

In January of this year the treasurer of the Consolidated Telegraph and Electrical Subway Company filed a sworn statement with the Comptroller to the effect that the cost of construction of electric light and power subways to January 1, 1903, amounted to $7,492,200.62. The Commissioners of Accounts, after an examination of the books of the company in September last, reported that the amount given by the treasurer of the company is over $3,000,000 above the true cost, and if we may draw any deductions from data received as to the cost of similar construction in other cities, the figures given by the Commissioners of Accounts are still too high. The City has brought an action for an accounting to determine the exact amount due under the contracts above referred to.

The appropriation for public lighting for the current year, 1903, is $3,306,346.23. This includes all sums appropriated for lighting the streets, public places and public buildings. At present about forty per cent. of the appropriation is needed for illuminating gas and about sixty per cent. for arc and incandescent electric lights. As there have been very few extensions of street lamps since January 1, 1903, the appropriation for that purpose is sufficient, even at the prices paid for lights under the contracts for 1902. The Board of Education has, however, largely increased the number of lights installed in the schools, and in case no reduction in price is effected transfers of funds will be necessary to meet deficiencies in that department.

The prices bid for open flame gas lamps range from $12 per lamp per year bid by the New Amsterdam Gas Company, a subsidiary of the Consolidated Gas Company, to $22 bid by the Central Union Gas Company, and $24 by the Northern Union Gas Company (both companies under the control of the Consolidated Gas Company) and $25 by the Newtown and Flushing Gas Company, Queens Borough Gas and Electric Company and Newtown Gas Company. The greatest number of open flame gas lamps in the City is, however, supplied by the Consolidated Gas Company at $17.50 and the Brooklyn Union Gas Company at $16 per lamp per year. These same prices have prevailed for many years, and while the wide range in charges may be accounted for to some extent by local conditions in different districts, the price in each district seems to be arbitrarily fixed by the company operating therein. There is no district where more than one independent company operates.

The Consolidated Gas Company bids for 1903 for open flame lamps $17.50 per lamp per year, agreeing to furnish 22-candle power gas through a burner consuming three cubic feet per hour at a pressure not less than one inch. In the year 1882 the Metropolitan Gas Light Company, since absorbed by the Consolidated Gas Company, bid for such lights $17.50 per lamp per year, agreeing to furnish gas of from twenty to thirty candle power through a burner consuming three cubic feet an hour at a pressure of not less than one inch. In the year 1882 the lowest price charged to private consumers in the Borough of Manhattan was $2.25 per 1,000 cubic feet. During the past twenty years the cost of manufacture has been greatly reduced and the price charged to private consumers in this Borough is to-day $1 per 1,000 cubic feet. It is also difficult to see why the price bid in Manhattan should be above the bid of the Brooklyn Union Gas Company for the same service in most of Borough of Brooklyn, where illuminating gas is sold to all private consumers at the same price as in Manhattan. On the other hand, for mantle lights the price named in Manhattan is $29 per lamp per year, while the corresponding bid in Brooklyn is $31.

A proper adjustment of prices for mantle lights with a more extended use would, in our opinion, result in marked improvement in street illumination. We are in a position to state that such improvement can be attained, and that the leading gas companies will co-operate to that end. The Consolidated Gas Company, with its subsidiary companies, at present maintains in the boroughs of Manhattan and The Bronx between nineteen and twenty thousand open flame gas lamps, and somewhat less than five thousand incandescent gas mantle lamps. A mantle lamp, while consuming less illuminating gas, gives out three times as much light as the open flame burner. General use of the latter is, consequently, poor economy. If all the open flame burners in the boroughs of Manhattan and The Bronx were changed to mantle lamps and the Consolidated Gas Company were given a contract for supplying 22,500 and upward of the latter, that company would materially reduce the price now bid for such lights. It may also be practicable to have the gas company supply the illuminant alone, and leave to open competition the maintenance of the lamps themselves. By changing to mantle lights, the illumination to our gas lit streets can be more than doubled at a comparatively slight increase over the present cost. Power to make a long term contract, as previously recommended, would facilitate such a change and enable the City to secure the most favorable terms.

The charge for 2,000-candle power electric arc lamp in Manhattan and The Bronx is $146 per lamp per year. This is far above that which is charged in other cities in the United States for the same service. There are 5,050 arc lamps in service in Manhattan and The Bronx—2,234 are served by overhead wires and 2,816 are upon underground system. The same prices are bid for lamps on both systems. The prices bid for electric lighting of public buildings are also higher than the City should be compelled to pay. The New York Edison Company charges on the average 10.15 cents per kilowatt hour. The City is undoubtedly the largest customer of that company, but does not receive as favorable terms as certain other customers in the Borough of Manhattan. We are informed that the Edison Company is supplying current to some of their private consumers at from one-half to one-third the above rates. These consumers, of course, have the option of obtaining current from their own plants if the Edison rates are not made satisfactory—an option which the State Legislature ought certainly to grant the City.

The Edison Electric Illuminating Company of Brooklyn bids $124.50 per year for a 1,200 candle power lamp and 14 cents per kilowatt hour for incandescent lighting in the public buildings.

In every borough of the City the prices for electric lighting are, in our opinion, unreasonably high.

We are unable to report that under existing conditions any of the lighting companies are willing materially to reduce their claims or charges for lights supplied during the present year, or that upon readvertisement of the same proposals lower prices will be bid for lights furnished the City.

We concur in the Commissioner's recommendation that all bids received for 1903 public lighting be rejected, with this modification: that we recommend the acceptance of the lowest bid for open flame gas lamp, viz., that of the New Amsterdam Gas Company, at $12 per annum.

With competition in no single district of the City possible, no good can come by again advertising for new proposals in the other districts. In the meanwhile the price thus fixed for one district will thrown upon the other companies the burden of proving why the City should pay more for any district than it pays for this one. As Judge Monell held in the suit of the Harlem Gas Light Company, 3 Rob., pages 121, 122:

"The law must have a reasonable construction. If the object in a given case fails of accomplishment, the law construed by its intention must also fail. To advertise for proposals for a supply of gas in a district exclusively occupied by one gas company would be a practical absurdity."

In 33 N. Y., pp. 324, 325, Judge Porter said it would be an "absurd conclusion" to hold "that the Legislature designed to insert a provision in the City Charter compelling the corporation to pay whatever price the sole bidder might choose to exact in his sealed proposals."

We are firmly of the opinion that a City official is not justified in accepting a bid merely because the statutory requirements as to public advertisement have been complied with. The theory that the lowest competitive bid affords a practical test of what is a fair and reasonable price falls to the ground when there is no real competition. When a fair price for an article cannot be reached or even indicated by actual competition, the sum the City is to pay should be settled after investigation into the cost of production and delivery of the commodity supplied.

Under section 149 of the Greater New York Charter the Comptroller has power to settle and adjust all claims against the City, and through his ability to subpoena witnesses and compel them to testify under oath he has ample facilities for testing the correctness of any claim which may be filed with him. The companies which have provided public lighting during the current year should file their claims with the Comptroller. Any company feeling aggrieved by his decision can doubtless recover by suit what it may be reasonably entitled to receive.

While these various questions have been under discussion, the Comptroller has been ready and willing to pay 80 per cent. of all gas bills and 60 per cent. of all electric lighting bills, without prejudice to the City or to the companies.

In view of the recommendation made by this Committee to-day, to the effect that the bid of the New Amsterdam Gas Company for $12 per lamp per year be accepted as the standard for open flame gas lamps, it is recommended that the Comptroller limit his payments on account, so far as open flame gas lamps are concerned, to $12 per lamp, pending the adjustment of the questions in dispute between the City and the companies.

We again urge the recommendation made to the Legislature last March, that section 530 of the Charter be so amended that the Commissioner of Water Supply, Gas and Electricity may make lighting contracts without public letting for a term not exceeding five years, when authorized by the Board of Estimate and Apportionment so to do, and also that a bill be passed empowering the City to establish and maintain an electric lighting plant for public purposes.

Respectfully,

(Signed) SETH LOW, Mayor;
EDWARD M. GROUT, Comptroller;
C. V. FORNES, President, Board of Aldermen,
Committee.

Dated December 4, 1903.

After the reading of the report of the Committee, the President of the Board of Aldermen moved that the report be adopted.

Which motion was adopted by the following vote:

Affirmative—The Mayor, the Comptroller, the President of the Board of Aldermen and the Presidents of the Boroughs of Manhattan and Richmond—12 votes.

Negative—The President of the Borough of Queens.

The President of the Borough of The Bronx did not vote.

The Comptroller offered the following resolution, recommending that all bids for public lighting be rejected except the bid of the New Amsterdam Gas Company:

Resolved, That the Board of Estimate and Apportionment recommends to the Commissioner of Water Supply, Gas and Electricity that all bids for public lighting for the current year be rejected, except the bid of the New Amsterdam Gas Company at twelve dollars ($12) per annum for open burners, this Board deeming it for the best interests of the City so to do.

Which was adopted by the following vote:

Affirmative—The Mayor, the Comptroller, the President of the Board of Aldermen and the Presidents of the Boroughs of Manhattan and Richmond—12 votes.

Negative—The President of the Borough of Queens.

The President of the Borough of The Bronx did not vote.

"VII."

Office of the Commissioners of Accounts,
Rooms 104, 105, 115, 119 and 212,
Stewart Building, No. 280 Broadway,
New York, September 28, 1903.

Subject—Examination of the accounts and records of the Consolidated Telegraph and Electrical Subway Company, for the purpose of ascertaining the cost of construction and the earnings of the company, as to both of which questions The City of New York is an interested party.

Hon. SETH LOW, Mayor:

Sir—The investigation herein reported on was instigated by Hon. Robt. Grier Monroe, Commissioner of Water Supply, Gas and Electricity, that Department being the successor by law of the Board of Electrical Control, under whose supervision the subways carrying all the electrical conductors in use in the City have been constructed.

The law and the contracts under which the subway companies operate give to the Comptroller the right to examine their books and records at any time and to take copies of the same.

In the exercise of this right, the Hon. Edward M. Grout, Comptroller, deputized a member of our staff to make this examination, and we beg to submit to your Honor his report as made to the Comptroller:

"I beg to sumbit herewith the results of an examination of the books, accounts and records of the Consolidated Telegraph and Electrical Subway Company, of this City, which examination I was deputized by you to make, in a letter addressed to the said company on July 31 last.

"The original account books kept by the company from the date of its organization were not accessible when first applied for, and it was not until September 16 that I was put in possession of them, and after legal proceedings to compel their production were begun by the Corporation Counsel.

"Since the beginning of the examination, the officers and employees of the company with whom I was brought into contact have showed every courtesy and facilitated its progress so far as they were called upon.

"Two contracts were entered into between the Board of Electrical Control in and for The City of New York, and the Consolidated Telegraph and Electrical Subway Company, the first dated July 27, 1886, and the second dated April 7, 1887; the first one seeming to have been supplemented because of an opinion rendered by one of the Judges of the Court of Common Pleas that the law and the action of the Board thereunder was improper and unconstitutional, which necessitated an appeal to the State Legislature for additional legislation.

"The purpose of these laws and contracts was to provide for the elimination of overhead electric wires in The City of New York, and placing the same underground in properly constructed subways.

"The interest of The City of New York, other than to provide for the submerging of dangerous and unsightly electric wires, in the said contracts, is a financial one, and is expressed in these terms:

"'Section VI—Whenever the net annual profits of the party of the second part, remaining after the payment of the expenses of maintaining and operating such subways, shall exceed ten per cent. upon the actual cash capital invested by it in providing, constructing and equipping such subways, then the excess of such profit over the ten per cent. shall be paid into the treasury of The City of New York; but, if in any year or years prior to the earning of such excess, the earnings of the party of the second part shall not have equaled ten per cent., then the part of the second part shall first be entitled to recoup itself out of such excess for the difference between the actual annual earnings and the said ten per cent.,

the intention hereof being that no payment shall be made to The City of New York out of such excess of earnings until the party of the second part shall first have actually earned and received ten per cent. for each year theretofore.'

" 'Section XV—The said party of the second part shall, at any time after January first (1897), eighteen hundred and ninety-seven, upon the demand of the Commissioners of the Sinking Fund of The City of New York * * * sell, assign, transfer, convey and set over to the Mayor, Aldermen and Commonalty of said City, all or any of the subways constructed by it as aforesaid, and all or any of the contracts or other property of any kind held or owned by the party of the second part for any of the purposes of its incorporation, subject, however, to all leases, mortgages or contracts heretofore lawfully made within the limitations imposed by section XII. of this contract when the said Commissioners of the Sinking Fund shall request them to and for the payment for which the said Commissioners of the Sinking Fund shall provide, as provided by any law hereafter passed, but not less than the cost thereof; and if the said company shall not have earned ten per cent. per annum on actual cost during the term of this contract, a further payment shall be made, in addition to the cost, not exceeding ten per cent. on such cost, to the extent of such deficiency in annual earnings.'

"The limitations above referred to, imposed by section XII., read as follows:

" '* * * subject to any valid mortgages or liens then thereon outstanding, not exceeding fifty per cent. on the actual cost of such subways.'

"Section 1 of the contract of July 27, 1886, reads as follows:

" 'The party of the second part agrees to furnish the capital necessary to build the subways herein contemplated, not less than three million dollars, and will build, equip, maintain and operate the same as herein provided.'

I have underscored the words I desire to call particular attention to, and will have occasion to refer to them later.

"The contract of July 27, 1886, was drawn up by Mr. Daniel L. Gibbens, counsel of the Commissioners of Electrical Subways, in consultation with counsel representing the Consolidated Company, and prior to its execution he brought all the parties together and addressed them on the subject of the contract, his evident purpose being to construe any doubtful passages, to clear up any expressions of the agreement not made entirely plain on its face, and as he expressed it—

"At the beginning of such a work as this, * * * it is well, so far as the Commission and the company that engages to act as its servant or agent are concerned, that there should be no misunderstanding, no cause for dispute, and that no trouble should arise that would increase the diffculties, already sufficient.

"A careful reading of both contracts evidences that much time and thought were given to their preparation, but I think we may agree with the further remarks of Mr. Gibbens when he stated that

"In drawing contracts, it is always a matter of great diffculty to provide absolutely for everything that may arise, and very often the man who draws the contract is the very worst man in the world to interpret it. * * *

"He then entered into a discussion of the details of the contract and stated:

"The first point which is provided for is the construction of a subway, the money for the construction of which is to be furnished by the contracting company.

"That certainly did seem like a perfectly plain and easily understood provision of the contract, and doubtless evoked no discussion, but I shall be obliged to show in connection therewith that the subject was one which was not duly considered in all its bearings, and which is likely to cause some trouble before it is settled.

"From the minute-books of the Consolidated Company, I find it was organized on December 26, 1885, under the laws of the State of New York, with a subscribed capital of $10,000—which by an entry in its cash book was fully paid up on December 31, 1886.

"At the first meeting of its Board of Directors, held on December 28, 1885, it was resolved to communicate with the Commissioners of Electrical Subways and offer to construct the proposed subways, the communication proposed to be sent being engrossed in full on the Minute Book.

"Therein was this statement made:

"We represent a capital of three millions of dollars, which we believe to be ample for the performance of all the work of construction.

"Can there be a doubt that the intention was to imply that the company owned or possessed this considerable sum? As a fact, the stockholders of the company on that same day authorized an increase of its capital stock from ten thousand dollars to three million dollars, but in no other way did the Directors represent such an amount of capital, as the words would be commonly understood.

"As a further fact, the total cash receipts of the company from sales of its capital stock, from the date of its inception to the present time, have been $40,000. I am not to be understood as meaning that for the remainder of its issue of stock it did not get some kind of value. As to what that value was will be the subject of future discussion.

"The cash book shows receipts from sales of or payments on account of subscriptions to stock, as follows:

1886, Dec. 31,	From A. S. Dodd, Trustee, for 100 shares	$10,000 00
Dec. 28,	Phoenix Construction Company, in accordance with contract, 1 per cent. on 16,000 shares	16,000 00
Dec. 28,	From Edward Lauterbach, 1 per cent. on 7,500 shares	7,500 00
1887, Feb. 19,	Phoenix Construction Company, additional contract whereby they subscribe for 6,500 shares, paying 1 per cent. in cash and the remainder substantially as provided for in former contract; former contract provides for construction of 400 miles of duct in addition to present contract	6,500 00
		$40,000 00

"Payment of above sum was made by Edison Light and Power Installation Company.

'Certificates for the full amount of the subscription were issued to the subscribers named above, on the payment of one per cent. thereof, excepting in the case of the last subscription by the Phoenix Construction Company, for which no certificate was issued.

"The stock subscription of the Phoenix Construction Company was adjusted by an entry made December 31, 1890, when it was charged in current account with its subscription to 11,250 shares less the amount that had been paid on its two subscriptions aggregating 22,500 shares, or $22,500.

"It then surrendered to the Consolidated Company its subscription of the remaining 11,250 shares; and the account of the Phoenix Company in the stock ledger shows that its total subscription was issued to it, ultimately, and that when it surrendered the 11,250 shares, it was treated as 'treasury stock,' so that the stock account on the books of the Consolidated Company.

Now shows its capital stock all issued	$3,000,000 00
While it shows as an asset, 'treasury stock'	1,125,000 00

"The stock ledger furnishes further interesting information as to the stock dealings with Mr. Edward Lauterbach, who appears to have been one of the original promoters of the Consolidated Company, an officer and director.

"He is credited in the stock ledger as the owner, on December 22, 1886, of 7,500 shares of the capital stock. The cash book shows that on December 28, 1886, he paid one per cent. of this amount, or $7,500.

"In April, 1888, it became necessary to effect a settlement with the North American Company for what was known as the Johnstone patent, together with the 'rights, franchises, etc.' of said company, and this settlement was made by the payment of 7,180 shares, which was furnished by the Phoenix Construction Company.

"In August of that year, the latter company was reimbursed for its advance, by a transfer of stock from the account of Mr. Edward Lauterbach; but tracing the stock issued to the North American Company, it is seen that it was transferred from that account to the account of Mr. William H. Johnstone in two blocks of 4,680 and 2,500 shares, and from Mr. Johnstone's account, the block of 4,680 shares immediately found its way to the credit of the account of Mr. Lauterbach, thus converting stock of the par value of $468,000, on which 1 per cent. had been paid, into full paid stock. It may be that this was a perfectly legitimate transaction, but as an interested party I am inclined to the opinion that The City of New York will want to be shown that it was so by better evidence than can be obtained from the books of the Consolidated Company.

"In this connection, there is a comparatively small discrepancy which the accounts do not explain; there is a charge to construction account of $732,500 for stock which the journal entry says was issued to E. Lauterbach for the patents, rights and other franchises of the North American Company.

"I have previously shown that the said company received stock of only the par value of $718,000.

"There are a number of other transactions in the stock of this company that will require explanation, if The City of New York ever decides to exercise its right to take over the subways at their actual cost of construction; but it is perhaps sufficient to say at this time that the total outstanding issue, amounting to the sum of $1,875,000, has been charged to the construction cost, while the actual cash received therefrom has been $40,000, and it will remain for the officers and directors to show what additional value was received for the issue.

"Below is a list of the present stockholders, with their holdings entered here merely to preserve the same for possible future use:

Name and Address.	Number of Shares.
Anderson, Theo. P., No. 132 Broadway, New York City	167
Beardsley, Samuel A.	1
Brady, Anthony N., No. 55 Duane street, New York City	120
Brady, Nicholas F., No. 55 Duane street, New York City	1
Donovan, Timothy, No. 322 West Forty-sixth street, New York City	50
Fischer, Geo. J., No. 502 Broadway, New York City	50
Gawtry, Lewis B.	1
Gawtry, Harrison E.	1
Gilbert, Charles R. H., Townsend Building, New York City	550
Hyer, Lewis Spencer, Rahway, New Jersey	10
Hemmens, Henry J.	1
Lauterbach, Edward, No. 22 William street, New York City	100
Kilborn, Horace M.	2,000
Lyon, George W., No. 47 Broadway, New York City	30
Lieb, John W., Jr., No. 166 West Ninety-seventh street, New York City.	50
Morgan, Norman S., No. 50 East Twenty-third street, New York City	5
Murray, Thomas E., No. 59 Wall street, New York City	1
New York Edison Company, The, No. 55 Duane street, New York City	138
Sefton, William J., No. 55 Duane street, New York City	1
Sallinger, Edward, Hoffman House, New York City	47
State Trust Company, The	15,160
Vanderhoven, Rose, Rahway, New Jersey	5
Woolverton, Wm. H., and Cutler, C. F., trustees	261
Total shares	18,750

"Of the 15,160 shares held by the State Trust Company, 11,250 came from the Phoenix Construction Company, passing through the account of Mr. William H. Woolverton, a former director of the Consolidated Company.

"Having no adequate capital of its own, the Consolidated Company procured the work of construction to be carried on by another corporation styled the 'Phoenix Construction Company.' This latter company not only subscribed 22,500 shares of the stock of the Consolidated Company and paid 1 per cent. thereon, but it loaned money to the said company for its current expenses:

In 1887	$45,000 00
In 1888	75,371 33
In 1889	46,000 00
In 1890	30,000 00

"Some portion of these loans were subsequently paid in cash. The Phoenix Company was settled with mostly in stock and first mortgage, second mortgage and debenture bonds of the Consolidated Company, taking the first mortgage bonds at a discount of 10 per cent., the second mortgage bonds at a discount of 40 per cent., and stock and debenture bonds nominally at par; these discounts are charged as part of the cost of construction.

"The contract with the Phoenix Company, made on December 21, 1886, provides as follows:

"Phoenix Construction Company shall construct necessary subways in The City of New York, with conduits, ducts and other appurtenances, and will furnish all materials or supplies needed, not exceeding 800 miles of single duct.

"Phoenix Construction Company for all such work, materials and supplies, shall receive $2,500,000, or, at the option of the party of the first part, shall receive actual cost, plus 15 per cent., and at the same rate for any portion less than the whole of such work.

"On December 31, 1890, the Phoenic Company received its first credit on the books of the Consolidated Company on construction account, the aggregate of the several items of credit being $6,248,487.32.

"The first item is a credit of $2,500,000, with the explanation: 'Contract, December 21, 1886, for 800 miles duct.'

Another item calls for a credit of	$552,220 92
To which is added 15 per cent	82,833 11
And interest, estimated	6,000 00

—which is for subway construction in 1890 for 185 11-100 miles single duct.

"Other large sums are also credited for subway work, but the mileage is not mentioned.

"From the schedule of duct mileage kept by the Consolidated Company, year by year, I find that the total mileage of single duct constructed at the close of the year 1890 was 528½ miles; which, considering the above credits to the Phoenix Company, seems to call for an explanation that cannot be obtained from the books.

"Then, too, I raise this question: If the Consolidated Company was under obligation to render an account to The City of New York for the "actual cash cost of construction.' could it legally swell the actual cost by allowances of 15 per cent. paid to another who did the work?

"And, again, could it properly swell the actual cost by interest paid on loans?

"I have decided these questions for myself and shall make a showing of construction account, eliminating such charges, my theory being this: that the Consolidated Company agreed that it had the necessary capital, which it was willing to employ and earn thereon a net ten per cent.

"For the sake of the argument, assume that the company had possessed $3,000,000, and had spent just that sum in construction, it would have been entitled to earn $300,000 a year net, and in the event of the City taking over the property it would have had to refund only the $3,00,000, plus a further sum not exceeding ten per cent. thereof, if the net earnings had not equalled ten per cent. annually.

"On the other hand, assume that the company having no funds was obliged to employ another to do the work and pay fifteen per cent. on its cost; then the cost to the company would be $3,450,000, instead of $3,000,000, and the earnings, before the City could share in them, would have to be $345,000 instead of $300,000.

"Further than this, assume that the company made its payment in six per cent. bonds at an average discount of ten per cent., its then cost of $3,450,000 would be swelled to $3,833,333, and the annual earnings to $383,333 before the City could share therein.

"Finally, assume that the company charged the interest paid on its bonds as an expense item, then there would have to be earned annually before the City could become a sharer in the profits of the investment $613,333, instead of the amount of $300,000, as seems to me was contemplated by the contract.

"This latter state of affairs is practically the one that exists at the present time, and it is my belief that a proper allowance of items only for cost of construction, and

an elimination of certain improper expense items, would result in showing a large sum now due to the City from earnings.

"The profit and loss account on the company's books shows an adverse balance on the first of January, 1903, of $716,746.70, which means that during the entire terms of its operations since 1887, it has failed to earn a cent on its investment, but has run at a loss.

"The debit side of the account, however, contains interest charges, mainly on its bonds, in the aggregate sum of $2,980,187.73.

"To follow the question no further than this one item, was such a condition contemplated by the contract, or under the contract, can it be allowed to proceed in this manner?

"At the close of 1890, the Consolidated Company parted company with the Phoenix Company, and employed the Empire City Subway Company to do its work of construction during 1891, and for the first quarter of 1893, paying therefore fifteen per cent. additional to the cost and settling the account partly in first mortgage bonds at 90 partly in second mortgage bonds at 60, and partly in debenture bonds at par; all the bonds bearing six per cent. annual interest.

"For the remainder of 1893, and up to the end of November, 1898, the construction work was done by the Union Subway Construction Company, on the cost, plus fifteen per cent. basis, and settlement made chiefly in debenture bonds.

"All of the debenture bonds, which were originally for a term of five years, are still outstanding.

"In December, 1890, by the consent of the Board of Electrical Control, which consent and subsequent action was made legal by an act of the Legislature (chapter 231, Laws of 1891), the Empire City Subway Company (Limited) took over from the Consolidated Telegraph and Electrical Subway Company so much of the subway construction as accommodated the telegraph and telephone wires and certain of the low tension light wires, and thereafter, on the fifteenth day of May, 1891, the said Empire City Company entered into a contract with The City of New York by its Board of Electrical Control, of precisely the same tenor as the existing contracts with the Consolidated Company.

"The construction account of the Consolidated Company thereby received as credit of $3,657,633.25. Two million five hundred thousand dollars of this sum is represented by first and second mortgage bonds of the Consolidated Company (one half of each kind), which were assumed by the Empire City Company.

"The total amount of bonds issued by the Consolidated Company stand as a liability on its books, but there is an account with the Empire City Company standing with an open debit of $2,500,000, which, with its explication, stands as an offset to the bond liability.

"I find that in its annual charges for interest on bonds, the Consolidated Company properly eliminates the interest on this $2,500,000.

The balance of construction account stood on the last of January, 1903.		$7,492,291 62

"The items I would eliminate therefrom are as follows:

1888.	7,325 shares capital stock issued to E. Lauterbach for the patents, rights, etc., of the North American Underground Telephone Company, and other franchises	$732,500 00
1890.	15 per cent. on cost allowed Phoenix Construction Company	131,250 00
	Interest allowed Phoenix Construction Company	171,041 00
	15 per cent. on cost allowed Phoenix Construction Company	88,881 70
	Interest (estimated) Phoenix Construction Company	7,500 00
	15 per cent. on cost allowed Phoenix Construction Company	82,833 11
	Interest allowed Phoenix Construction Company	6,000 00
	15 per cent. on cost allowed Phoenix Construction Company	73,807 85
	Interest allowed Phoenix Construction Company	7,493 95
	Discount on bonds, allowed Phoenix Construction Company	1,187,500 00
	Stock issued to Phoenix Construction Company, less amount paid thereon	1,102,500 00
1891.	15 per cent. on cost to Empire City Company	32,716 77
	15 per cent. on cost to Empire City Company	2,782 65
	Interest to Empire City Company	5,357 37
	Discount of bonds, to Empire City Company	86,200 00
1892.	Discount on bonds, to Empire City Company	60,600 00
1893.	15 per cent. on cost to Empire City Company	24,928 95
	Interest to Empire City Company	1,368 13
1894.	15 per cent. on cost to Union Subway Company	24,674 41
1895.	15 per cent. on cost to Union Subway Company	14,914 19
1897.	15 per cent. on cost to Union Subway Company	27,267 17
1898.	15 per cent. on cost to Union Subway Company	43,044 81
		$3,915,162 06
	This should perhaps be reduced by the discount on the $2,500,000 bonds issued by the Empire City Company	625,000 00
		$3,290,162 06
	Adopting this method of figuring, the total cost of construction to date would stand at	4,202,129 56
	The earnings from rentals for 1902 were	462,852 77

"There are a number of doubtful items charged to 'construction' that I have not here taken from the account, being aware that this examination and the report thereon are merely tentative, nor have I made any comments on the expense accounts, which, of course, only affect the net earnings, but they have all been examined with care, and the least that can be said is that, prior to 1899, the spirit of strict economy did not prevail in all departments of the company.

"The total charge to 'Legal Expense' from 1887 to 1902, inclusive, is $11,816.33. Of this amount, there was paid to Mr. Edward Lauterbach and to the firm of which he was a member the sum of $4,321.41 during the years 1887-1891, he being a member of the Board of Directors during that time, and subsequently, up to 1899.

"Beginning with January 1, 1899, the books of the company reveal an entirely different state of affairs from that which previously existed; the work of construction is done by the company at probably the lowest prices for which it can be done; payments are made in cash for all ordinary accounts, and it is evidently managed in a business-like way for purely business purposes.

"It may be a criticism to say that the company uses its earnings to past due interest coupons and issues a 5 year debenture bond to pay for the cost of construction, the two items somewhere near equaling each other, but whether a criticism or not will depend largely upon whether or not my view of the question of interest is sustained.

"It seems to me that the spirit of the contract, as well as a business-like interpretation, is that if the company borrows money at 6 per cent. for all of its construction work, instead of furnishing it from its own resources, that then it shall be entitled to recoup only 4 per cent. additional before the City comes in for its share.

"I have considered the fact that the contract provides that, in the event of the City electing to take over the property, it shall not be burdened with a lien in excess of fifty per cent. of its cost, thereby implying a right or an expectation that the company would borrow money for one-third of the total cost, but it does not seem to me that any right would thereby exist to recoup the interest paid, from earnings, before making a division with the City.

"The total of bonds outstanding for work done up to January 1, 1903, is as follows:

First Mortgage Bonds	$2,799,000 00	
Less assumed by Empire City Company	1,250,000 00	
		$1,549,000 00
Second Mortgage Bonds	$2,636,000 00	
Less assumed by Empire City Company	1,250,000 00	
		1,386,000 00
Debenture Bonds		2,601,000 00
Total		$5,536,000 00

"In my opinion, this is a greater sum than the total of actual cash cost of the work to date.

"I am informed, and from the examination made believe, that the Consolidated Telegraph and Electrical Subway Company is now owned or controlled by the New York Edison Company, while the Empire City Subway Company (Limited) is owned or controlled by the New York Telephone Company."

Respectfully submitted,

(Signed) EDWARD OWEN, Commissioner of Accounts.

Office of the Commissioners of Accounts, Stewart Building,
New York, October 9, 1903.

Subject—Examination of the books and records of the Empire City Subway Company (Limited), to determine the cost of construction and the net earnings since 1890.

Hon. EDWARD M. GROUT, Comptroller, City of New York:

Sir—Following my report to you on September 28, concerning an examination of the accounts of the Consolidated Telegraph and Electrical Subway Company, I began an examination of the books of the Empire City Subway Company (Limited), and, having concluded the same, beg to submit herewith the results obtained.

The early history of the two companies was so closely interwoven that the former report should be read in connection with the present one, in order to get a clear idea of the general situation with regard to the subject of subway construction for the accommodation of electrical wires in the City of New York.

From the examination of the records of both corporations it is evident that the same interests which led to the incorporation of the Empire City Company were more or less prominent in the subway and conduit construction from its inception.

The Empire City Subway Company (Limited) was authorized by a license from the State of New York to begin business on July 12, 1890, with a capital of $500,000.

One-half of this amount was originally subscribed by the incorporators:

W. T. Bouchelle, New York City	$248,000 00
H. F. Stevens, Brooklyn	500 00
U. N. Bethell, Brooklyn	500 00
J. C. Reilly, Brooklyn	500 00
David B. Parker, Brooklyn	500 00
	$250,000 00

Ten per cent. of these subscriptions ($25,000) was paid in cash, and that the persons named were in fact the representatives of the Metropolitan Telegraph and Telephone Company may be assumed from the fact that the said corporation ultimately assumed and paid the remaining 90 per cent. of the said subscription.

By two contracts dated July 3, 1890, and one contract dated December 6, 1890, the Empire City Company acquired from the Consolidated Company (abbreviations adopted as to both corporations) all the subways, conduits and ducts that had been constructed by the latter company for the accommodation of telegraph and telephone conductors and certain low tension wires used by the Edison Electric Illuminating Company.

It may be well to state here that the actual cash cost of construction can never be ascertained from the books of the corporations who entered into contracts with the City to furnish the money and do the work for the reason that such cost is concealed by procuring the work to be done by subsidiary companies formed solely for that purpose, which latter companies received such credits as the contracting corporations saw fit to give them, the cost of construction being charged with the amount of such credits.

From the records of the Empire City Company it is proved that an allowance of 15 per cent. was added to the true cost, but whether the charges to which the 15 per cent. was added were legitimate or not can only be inferred and not substantiated.

This proof can only be had from an inspection of the records of the various constructing companies, and I have been unable to locate them or to get the names of their officers. Should the matter be pushed to its logical conclusion, of course all this information could in time be brought to light.

The Phoenix Company did no work for the Empire City Company, but that their relations did not entirely cease in 1890 is shown from the fact that on May 15, 1891, the directors of the latter company voted to borrow $100,000, and to loan $60,000 thereof to the former company.

The original capital stock of the Empire City Company was increased from time to time by proper action of the stockholders, until it now stands at $2,750,000, authorized with an issue at the close of 1902 of $2,505,000.

The last increase was made on December 31, 1902, by "unanimous consent of all the stockholders," and was an increase from $2,250,000 to $2,750,000; said consent was signed only by the New York Telephone Company and the Edison Light and Power Installation Company, who must therefore be taken as the owners of all the stock.

A dividend has been paid on the stock in every year, beginning with a dividend of 20 per cent., paid from the earnings of 1891—this percentage was largely decreased in the following years; and no percentage was again actually named until 1899, when 8½ per cent. was declared on outstanding stock.

The arrangement had the sanction of the Board of Electrical Control, as is stated in the contract entered into by said Board and the Empire City Company in July, 1890, the terms and conditions of said contract being identical with those in the contract between said Board and the Consolidated Company, briefly set out in my report of the 28th of September.

There is no evidence in the document itself that the Board knew or was concerned in the consideration to be paid by the Empire City Company for the property so acquired, but it is material to the interests of the City of New York that the said consideration should be carefully scrutinized, as it forms the initial charge on the books of the Empire City Company for "cost of construction."

As in the case of the Consolidated Company, the City is interested in two ways:

(a) It has the right to take over the property, after a date now long past, at its actual cash cost of construction;

(b) It has the right to receive all the net earnings of the company, after 10 per cent. has been earned and paid on such cash cost.

It will be remembered that the Consolidated Company procured the work of construction to be done by the Phoenix Construction Company, and that it paid for the work almost, if not entirely in stock and bonds at a considerable discount from par.

By its several contracts with the Consolidated Company, the Empire City Company acquired what I have found to be a total of 787½ miles of ducts for a total consideration of $3,664,969.80.

This is worked out as follows:

An equal amount each of the first and second mortgage bonds issued by the Consolidated Company, assumed and guaranteed as to principal and interest, by the Empire City Company	$2,500,000 00
An assumption by the latter of the debt due by the former to the Phoenix Construction Company, for extra allowance for 1899 work	162,640 97
Same for work in 1890, done for telegraph and telephone conductors	641,053 83
Same for work done in 1890 for Edison Electric Light conductors	353,938 45
And an adjustment of the latter item after it was taken on to the books of the Empire City Company, by which it was increased	7,336 55
	$3,664,969 80

As showing the affiliation between the companies contracting with the City and the constructing companies, I note that while all the items above, excepting the last one, are credited on the books of the Consolidated Company to the Phoenix Company; the latter company receive credit on the books of the Empire City Company for only the second and third items, while the item of $353,938.45 appears as a credit to the Edison Electric Illuminating Company.

How fictitious these figures are as representing the actual cash cost of constructing 787½ miles of ducts, may be inferred from the fact that the original contract between the Consolidated Company and the Phoenix Company provided for the construction of 800 miles for $2,500,000.

In the intermediate years the amount of net profit was shown at the directors' meetings, the directors voting that it be divided ratably among the stockholders.

The net profits shown for the various years, with the dividends declared, were as follows:

	Profit for Year.	Dividend Declared.	Stock Outstanding.
*1891	$104,605 20	20 per cent.	$500,000 00
1892	41,367 73	Ratably.	725,000 00
1893	58,591 91	Ratably.	827,000 00
1894	50,745 34	Ratably.	1,073,000 00
1895	56,068 40	Ratably.	1,142,000 00
1896	71,960 49	Ratably.	1,260,000 00
1897	94,226 05	Ratably.	1,335,000 00
1898	126,241 26	8½ per cent.	1,424,000 00
1899	117,597 40	7 per cent.	1,605,000 00
1900	114,872 60	7 per cent.	1,716,000 00
1901	203,052 09	9 per cent.	2,208,000 00
1902	226,156 44	9 per cent.	2,505,000 00

Profits included percentage on construction work done for Consolidated T. & E. Co.

The first yearly dividend was paid entirely to the Metropolitan Telegraph and Telephone Company; the second to the Edison Light and Power Installation Company; the following five to the Mercantile Trust Company, and the remainder to stockholders of record.

It is worthy of note that the last increase of capital stock was not authorized until December 31, 1902, and that on the same day $207,000 was issued; yet that stock participated in the 9 per cent. dividend declared out of the earnings of 1902.

In addition to revising the figures shown by the books of the Empire City Company, as the cost of construction, attention is again directed to the question of interest paid, which forms by far the largest item of expense account, which, offsetting the gross earnings, produces the net earnings, in which the City is vitally interested.

Putting an interpretation upon the contract with the City which seems to me the only proper one, the theory that the contracting company should be allowed to pay interest on money it had been obliged to borrow, in order to carry out its contract, before accounting to the City for net profits, is abhorrent to both the letter and the spirit thereof.

An ability to earn ten per cent. upon funds actually invested is not easily found, and in the case of public franchises could be conceded only when a considerable risk is undertaken.

It was conceded in the case under review, and according to my theory, the contracting company could only retain that rate upon the actual cost of construction; if its necessities were such that it had to borrow a portion of the funds needed to be used, it must itself pay the interest and not call upon the City to contribute any portion thereof.

In that case it would earn 10 per cent. upon that portion of the capital which is actually furnished, and only 4 per cent. upon that portion which it was obliged to borrow at an interest rate of 6 per cent.

Upon this theory I have made up my table showing cost of construction, gross earnings, expenses, and net earnings.

Construction.

It was shown in the report of September 28 that of the $2,500,000 of bonds issued for construction, the following discounts were allowed:

On $1,250,000 first mortgage bonds	$125,000 00
On $1,250,000 second mortgage bonds	500,000 00

It has also been shown that an allowance of 15 per cent. over cost was made to the subsidiary companies who actually supplied the funds and did the work.

In the following table of cost of construction, by years, I have eliminated both of those items as being an improper charge against the actual cost, in so far as the City is concerned, which alone is to be considered in the light of the plain provisions of the contract.

Even with such elimination it is not my opinion that the actual cost is arrived at, but merely that the contrary cannot be proved without access to the books and records of the subsidiary companies who actually did the work.

	Construction Cost, by Years, as Shown by the Company's Books.	Deductions Made by Examiner.		Net Total Cost at the End of Each Year.
1890	$3,664,969 80	Discount on bonds	$625,000 00	
		15 per cent. on contract work	151,952 59	$2,888,017 21
1891	285,838 65	15 per cent. on contract work	15,534 24	3,158,321 62
1892	205,638 97	15 per cent. on contract work	23,226 67	3,340,733 92
1893	491,191 00	15 per cent. on contract work	64,068 65	3,767,856 27
1894	138,116 23	15 per cent. on contract work	18,015 16	3,887,957 34
1895	236,731 30	15 per cent. on contract work	30,878 00	4,093,810 64
1896	150,721 19	15 per cent. on contract work	19,659 20	4,224,872 63
1897	176,904 07	15 per cent. on contract work	23,074 44	4,378,702 26
1898	361,907 37	15 per cent. on contract work	47,205 31	4,693,404 32
1899	221,565 46	15 per cent. on contract work	28,899 84	4,886,069 94
1900	417,553 04	15 per cent. on contract work	54,463 43	5,249,159 55
1901	569,428 39	15 per cent. on contract work	74,290 66	5,744,297 28
1902	591,979 17	15 per cent. on contract work	77,214 68	6,259,061 77
Total	$7,512,544 64		$1,253,482 87	$6,259,061 77

With this showing, which I feel quite sure is a conservative accounting of "actual cost," the Empire City Company now demands a yearly net earning of $125,348.28 in excess of 10 per cent. on cost of construction before allowing the City to participate therein.

In addition thereto it demands that it be still further permitted to charge all interest paid on its loans against the gross earnings before the City may share the benefits contemplated by the contract.

Bonds have been issued by the Empire City Company, in addition to the $2,500,000 of the issue by the Consolidated Company which it assumed, to the amount of.....$2,505,000 00

Consisting of:

First mortgage bonds, covering subway, etc., for telephone and telegraph lines.	1,937,000 00
Second mortgage bonds for the same	82,000 00
First mortgage bonds covering subway, etc., for Edison light wires..	486,000 00

—all bearing interest at the rate of 6 per cent.

The total of the mortgage, therefore, on the properties of the company is.. .....$5,005,000 00

—on a total cost of construction:

By the company's showing, of	7,512,544 64
And by my showing, of	6,259,061 77

A provision of the contract requires that in the event of the City exercising its option to take over the property it shall not be burdened with any mortgage lien in excess of 50 per cent. on the cost of construction, and as it is now so burdened in a sum greatly in excess thereof, an adjustment of interest on the outstanding long-time bonds, or a cancellation of a portion of them would have to be provided for should the City at any time decide to become the owner of the subways.

Results of Operation.

The following table will show the cost of construction, as modified by me; the cost of "maintaining and operating such subways," to use the language of the contract, and the net results at the end of each year.

The table is made up in a manner most favorable to the company, in that the expenditures for cost runs through the entire year, averaging perhaps six months only for the total, while I have allowed the 10 per cent. on each year's cost for the full year.

In any final accounting this would have to be adjusted and the 10 per cent. profit, or net earnings, figured only from the actual date when the expenditure was made.

I have eliminated from the gross earnings, profits shown to have been made on construction work done for the Consolidated Telegraph and Electrical Company.

The earnings for 1891 include about two and one-half month's operations in 1890.

By far the heaviest item of charge for operating expense is the cost of repairs, and here again we have concealment of the actual cost as it should be stated.

On December 10, 1894, the company entered into two contracts for maintaining and keeping in repair the subways; one with the Union Subway Construction Company, relating to telegraph and telephone conductors, at the rate of $100 per annum for each mile of a single duct, and the other with the Edison Electric Illuminating Company, relating to the wires of that company, at the rate of $200 per annum for each mile of single duct.

When it is considered that there are from ten to twelve ducts in each subway trench, that over some portion of the territory at least both kinds of ducts are built in the same subway, it will be seen that under these contracts from $1,000 to $2,000 per mile of subway, and in some cases more, is paid for maintenance.

When it is further considered that the structure is built of the most permanent materials, is underground, and not subject to the action of the elements, it is difficult to see where there could legitimately be any such cost for "Maintenance and Repairs."

Desiring to give the company the benefit of any explanation it saw fit to make as to the disparity in the contract price for maintenance, I applied to the Secretary for information on the subject, telling him frankly the reason and that his explanation would be embodied in my report.

After consultation with his colleagues he gave the following reasons why $200 per mile of duct was allowed for the Edison wires and only $100 for the telegraph and telephone conductors. That the construction cost of the former was much more, nearly double that of the latter; that it was more expensive to keep in repair, and that substantially all of the Edison ducts were in use, while only about one-half of the other kind were at present in service.

As to the element of cost of construction, I find from the company's own figures that the relative cost was as follows:

During Entire Period.	Telegraph and Telephone Average Cost per Mile.	Edison Average Cost per Mile.
1890-1902	$3,635 00	$4,775 00
1902 alone.	2,600 00	2,784 00

If it were permitted me to leave the realm of fact and indulge in a flight of fancy, I think I could give a reason more in harmony with the facts of the case than those recited above.

In the event of the City taking any action to acquire the property, or to protect its contract rights in the matter of net earnings, this question of cost of maintenance and repairs will of necessity be probed more deeply, and other books than those of the Empire City Subway Company will have to be inspected.

With structures of this nature it would seem as if maintenance cost should be trifling, but in the present year, under those contracts, there will be paid the sum of $224,210.10.

This is much more per mile of subway that it costs to maintain a Western railroad with its earth embankments, bridges and culverts subjected to the pounding of heavy trains and the disasters of rains, snow and ice.

No wonder a deficit is produced, and the deficit here shown is increased on the books of the Company by an aggregate interest charge of $2,839,740.02, together with a large additional sum in the excess cost of construction.

Year.	Cost of Construction as Modified by the Examiner.	Gross Earnings.	Operating Expenses and Maintenance.	Net Earnings.	Surplus on the Basis of Ten Per Cent.	Deficit on the Basis of Ten Per Cent.
1891	$3,158,321 62	$385,997 31	$66,952 55	$319,044 76	$3,212 60	.....
1892	3,340,733 92	314,145 93	100,818 00	213,327 93	.....	$120,745 46
1893	3,767,856 27	380,617 79	124,507 56	256,110 23	.....	120,675 40
1894	3,887,957 34	476,223 05	213,563 43	262,659 62	.....	126,136 11
1895	4,093,810 64	493,962 20	221,742 37	272,219 83	.....	137,161 23
1896	4,224,872 63	526,087 52	232,527 03	293,560 49	.....	128,926 77
1897	4,378,702 26	556,046 02	235,882 21	320,163 81	.....	117,706 41
1898	4,693,404 32	598,955 66	241,497 96	357,457 70	.....	111,882 73
1899	4,886,069 94	636,537 79	278,617 70	357,920 09	.....	130,686 90
1900	5,249,159 55	711,866 10	328,492 01	383,374 09	.....	141,541 86
1901	5,744,297 28	773,589 30	304,468 17	469,121 13	.....	105,308 60
1902	6,259,061 77	859,204 77	350,441 93	508,762 84	.....	117,143 34
					$3,212 60	$1,357,914 81
Net deficit					.....	3,212 60
						$1,354,702 21

By the contract between the Board of Electrical Control and the Empire City Subway Company (Limited), in the case of the City taking over the property, it would have to pay the actual cash cost of construction plus an amount for any deficiency of earnings thereon at the rate of ten per cent. per annum, but this latter item is limited in the aggregate to ten per centum of the cost.

The language of the contract is as follows, after providing for the purchase by the City, at its option, any time after January 1, 1897, upon payment of the actual cost:

"And if the said company shall not have earned ten per cent. per annum on actual cost during the term of this contract, a further payment shall be made in addition to the cost, not exceeding ten per cent. on such cost, to the extent of such deficiency in annual earnings, or such less sum as may be agreed upon."

Respectfully submitted,

(Signed) JOHN K. HAYWARD, Chief Accountant.

"VIII."

December 22, 1903.

Hon. ROBERT GRIER MONROE, Commissioner, Department Water Supply, Gas and Electricity, New York City, N. Y.:

Dear Sir—I beg to submit herewith a report on the electrical engineering work which has been referred to me as your Consulting Electrical Engineer, and which I have conducted in co-operation with the officers of your Department. There is also added a brief statement of the work which I have undertaken in co-operation with other departments of the City, thus covering all matters to which I have devoted my attention since August, 1902.

1. The systematic removal and the placing underground of overhead wires in the Borough of Brooklyn.
2. The removal of what is known as the West Side Pole Line, in the Borough of Manhattan, from Cortlandt street to the Harlem river, a distance of about nineteen miles.
3. Numerous inspections of electrical installations, for the purpose of deciding as to the safety of the appliances used.
4. The revision in 1902 of the technical portion of the electric lighting contract for both streets and public buildings.
5. The organization of an electrolysis investigation of the subsurface structures in the Borough of Brooklyn.
6. The revision of the rules and regulations as applied to electrical conductors and apparatus for all boroughs.
7. An investigation of and report on the Manhattan Railway Company's third rail protection to the end of permitting the company to experiment with a new contact shoe and devices for more certain operation during the winter months.
8. Investigation and report on methods leading to the elimination of subway manhole explosions.
9. In conference with the Police Commissioner we have selected a police telephone signal system for the use of the City which, in many respects, is much more simple and effective than those signal systems which up to the adoption of this one have been universally used. A contract was entered into between the Police Department and the New York Telephone Company, whereby the telephone company provides all apparatus for 661 telephone signal stations throughout the Borough of Manhattan, and maintains this apparatus in complete order. The Police Department simply furnishes the operators at the switchboards located in each precinct police station. In the adoption of this system a very considerable saving is effected over the more common system employed in other cities, and the City receives for the first time the benefit of a police signal system which has long been recognized as essential for the increased efficiency of the force.
10. I have also been in conference with the Fire Commissioner in regard to new fire alarm boxes for the Borough of Richmond, and have reported to him on that matter. I would suggest that the electrical conditions existing in the Fire Department be fully investigated to the end of improving them.
11. At the request of the Police Commissioner I have submitted to him a report on the relative advantages of an isolated plant and the Edison Company's service for electric light and power for the proposed Police Headquarters Building at Centre and Grand streets.
12. I have made a verbal report to the Mayor on the technical features of the Manhattan Auxiliary fire alarm system, which is controlled by the Gamewell Fire Alarm Company, and operated in connection with some of the fire alarm boxes of the City. This was done at his personal request.
13. At the request of the Commissioner of Street Cleaning, made through your office, I have materially assisted him and his engineering force in the electrical installation which he is making on the Pier at West Forty-seventh street. He is installing a small electric light plant, which is operated by means of the combustion of refuse matter brought to the dump. It is proposed to illuminate the dump, the Pier and Stable B, located on Fifty-second street, between Eleventh and Twelfth avenues. The work is now well under way and promises to be an interesting demonstration of the utilization of waste material.

DETAILS OF ABOVE ITEMS.

Removal of Wires in Brooklyn.

1. Under the resolution passed by the Board of Estimate and Apportionment on September 12, 1902, the following streets in the Borough of Brooklyn were selected as those upon which the removal of wires was to take place. These were to be cleared up on May 1, 1903, with an extension to June 1, 1903:

1. Fulton street, between Fulton ferry and New York avenue.
2. Broadway, between the East river and Myrtle avenue.
3. Jay street, between Myrtle avenue and Fulton street.
4. Smith street, between Fulton street and First place.
5. First street, between Third avenue and Fifth avenue.
6. Myrtle avenue, between Washington street and Broadway.
7. Bedford avenue, from Atlantic avenue to Myrtle avenue.
8. Flatbush avenue, from Fulton street to the Plaza at Prospect Park.
9. Prospect Park West, between Prospect Park Plaza and Ninth street.
10. Classon avenue, between Myrtle avenue and Kent avenue.
11. Washington street, between East river and Myrtle avenue.
12. Flatbush avenue, between Malbone street and Caton avenue.

On June 5, 1903, the Board of Estimate and Apportionment passed a resolution to the effect that the following streets were to be cleared of wires; and the date set when the wires were to be removed was January 1, 1904:

1. DeKalb avenue, from Clinton avenue to Broadway.
2. Broadway, from Myrtle avenue to Fulton street.
3. Fulton street, from New York avenue to Broadway.
4. Roebling street, from Broadway to Division avenue.
5. Division avenue, from Marcy avenue to Bedford avenue.
6. Flatbush avenue, from Eastern parkway to Malbone street.
7. Prospect Park West, between Fifteenth and Ninth streets.
8. Fourth avenue, from Flatbush avenue to Sixteenth street.
9. Nostrand avenue, from Putnam avenue to Park place.
10. Lee avenue, from Division avenue to Flushing avenue.
11. Atlantic avenue, from Flatbush avenue to South Ferry.

On an inspection made August 20, 1903, it was found that the various interests in Brooklyn, such as the Coney Island and Brooklyn Railroad, the Brooklyn Rapid Transit, the New York and New Jersey Telephone Company, the Edison Electric Illuminating Company, the Flatbush Gas and Electric Company, had taken considerable steps to place their wires under ground, or else to remove them from the streets.

Owing to the cordial co-operation of all parties the work required has gone along expeditiously, and much subway has been constructed by the New York and New Jersey Telephone Company, the Coney Island and Brooklyn Railway Company, the Brooklyn Rapid Transit and the Edison Electric Illuminating Company. As a matter of fact, more work has been accomplished by some of these companies than has actually been required by the Department.

I find that the work done by the Edison Electric Illuminating Company has been practically completed as required; but it has transferred to the Fire Department a number of poles which the latter desired to use for its wires, and consequently has not been able to remove them.

The New York and New Jersey Telephone Company has complied quite fully with all the requirements and is still pursuing the policy of placing its distributing wires and cables on the back fences of the various blocks. This is a very desirable arrangement, and is the one which has been adopted so successfully in the Borough of Manhattan, to the end that the overhead wires have been almost entirely eliminated.

The Coney Island and Brooklyn Railway has quite fully complied with all the requirements made of it and has constructed a large section of conduit on DeKalb avenue, thereby getting rid of a lot of overhead distributing feeders.

The Brooklyn Heights Railroad Company (otherwise the Brooklyn Rapid Transit) reports to me as follows, which statements in almost all circumstances I have checked:

"First Street, from Third Avenue to Fifth Avenue.

Subway has been constructed; cables are already installed and a few of the overhead cables have been taken down. The balance will be taken down as soon as we can complete connections between our new central power station and the Third avenue power station.

Lee Avenue, from Division to Flushing Avenue.

Subway has been constructed and cable has been ordered.

Roebling Street, from Division Avenue to Broadway.

Subway has been constructed and cable has been ordered.

Division Avenue, from Roebling Street to Broadway.

Subway has been constructed and cable ordered.

Kent Avenue, from Broadway to East River Bridge.

Subway has been constructed and cable ordered.

Flatbush Avenue.

Subway has been constructed from Bergen street to Caton avenue, and the underground cable is now in place. We are engaged in making connections to the overhead trolley line. When this is completed we will take care of Flatbush avenue, from Fulton street to Caton avenue.

Fifty-second Street, from Third Avenue to Fifth Avenue.

Subway has been constructed.

Atlantic Avenue, from Flatbush Avenue to South Ferry.

Subway has been completed from Flatbush avenue to Court street. From Court street to the ferry we expect to go in the Edison Company's ducts, which are already installed.

In addition to the above, we have also completed a subway on Twentieth street, from Third avenue to Crescent avenue, and on Crescent avenue, from Twentieth street to the Long Island Railroad crossing."

There still remains the difficulty of getting the Police and Fire Departments to remove their wires. Every endeavor has been made to bring the inconsistency of their position to the attention of the authorities, but seemingly without effect. It is a decided hardship to require operating companies to spend large amounts of money in the removal of their wires and placing them underground and then permit the Fire and Police Departments to still maintain their wires overhead and keep standing the poles which the operating companies have abandoned. These unfair and inconsistent conditions should be brought to the attention of both the Board of Estimate and Apportionment and the departments interested, and a request made for sufficient funds to remove and place in safer positions these two important signal lines.

West Side Pole Line.

2. In September, 1902, the matter of the removal of what is known as "The West Side Pole Line" was placed in my hands, and after numerous conferences with the engineers of the New York Telephone Company they found that it would be possible to have this heavy telephone pole line removed and replaced with underground cables fitted for their successful operation with coils constructed under the patents of Dr. M. I. Pupin, of Columbia University. The development of this work and the construction of the necessary subways have taken a long time, but I can report that some of the cables to replace this line are now in daily operation, and it is expected that by the first of February, 1904, the work of removing the poles and the wires which now are an eyesore to this part of the city will commence. It has been agreed that the poles and wires from Cortlandt street to One Hundred and Forty-fifth street and Broadway are to be entirely removed, while the poles from One Hundred and Forty-fifth street to the Harlem river shall have only part of their height cut off, leaving only a sufficient number of cross-arms to carry subscribers' circuits. The long distance through lines which now occupy all these poles will be supplanted by the underground cables. This has been a work of great magnitude, involving on the part of the telephone company the abandonment of approximately $200,000 worth of work and material.

Inspections.

3. I have made a number of inspections of electrical installations, and at the Columbia University laboratories have tested wires and insulation materials for the Electrical Inspection Bureau. This is a very important part of the work of the Department and should be continued.

Electric Lighting Contract, 1902.

4. In the fall of 1902 I revised the technical portion of the Electric Lighting Contract for Streets and Public Buildings, to the end that proper values were introduced into the table for power consumption of the different kinds of lamps. This had not been done before for the new conditions existing in the city, and to-day the technical portion of this contract is much more definite than previously.

Electrolysis in Brooklyn.

5. Under instructions from you there has been organized, and is now under way, an investigation of the effects of electrolysis on the subsurface structures in the Borough of Brooklyn. This investigation is directly in charge of Mr. H. F. Blackwell, who was selected as competent to conduct this work. He has been provided with all the necessary instruments and equipment, and has a force of men to assist him in taking the necessary readings and observations. A large amount of data has been secured on the flow of electrical current to, along and from the water pipes owned by the City. In co-operation with the Superintendent of Subsurface Construction in Brooklyn he has secured numerous samples of electrolytic corrosion of pipes, and anticipates securing much valuable data during the progress of the new contracts for water pipes in various parts of the Borough of Brooklyn. This investigation should continue, as it is felt that the matter of electrolysis of water pipes and other subsurface structures is one which should be carefully watched and should be under the direction and in the hands of those who are well equipped technically for the work.

Rules and Regulations.

6. Since becoming connected with your Department I have felt that the rules and regulations covering electrical apparatus and installations should be most carefully revised as to material and wording, and furthermore that these rules and regulations should be passed as ordinances by the Board of Aldermen. This is a work of great importance, particularly in view of the possibility of their becoming ordinances. I have spent much time upon the revision of the rules with the members of the Department and feel that this revision should be continued.

Third Rail Experiments.

7. The Manhattan Railway Company was permitted to remove on the Second Avenue Line the inside guard timber which is designed to protect people from contact with the third rail on the Manhattan structure. This was for the purpose of permitting them to experiment with a new form of contact shoe which would permit a covering to be placed over the top of the third rail. Their idea was to prevent the presence of sleet and snow from interfering with the operation of the system during the winter months. It would seem that the Department was justified in granting this permission, as no danger or harm has resulted from its removal.

Manhole Explosions.

8. I have investigated to some extent the matter of explosions in subway manholes. In all those manholes which I have entered and inspected, some of which had not been opened for a month, I found no presence whatsoever of gas, which in conjuction with air, might cause a serious explosion. The explosion at Twenty-third street and Sixth avenue in November was undoubtedly due to a heavy and severe short circuit of power cables owned by the Edison Electric Illuminating Company. In the event of considerable leakage of gas into a manhole the gas company is immediately notified and sends men to repair the gas main which is causing the trouble. Under conditions such as exist in New York City it can be only by frequent inspections and opening of the manholes, and by proper and effective ventilation, that the manhole explosions can be reduced to a minimum or entirely prevented. It is not possible to guard absolutely against an occasional trouble from the short circuiting of the cable and the consequent disturbance.

Police Signal System.

9. I have advised the Police Commissioner with regard to the police telephone system which he has established in the City, and can report that the Borough of Manhattan now has in some of its precincts, and will have eventually, the most satisfactory and best telephone signal system which has yet been devised. Being operated by the New York Telephone Company, its maintenance will be at all times of the highest order, and the City can in no wise suffer from any deterioration which might exist if it owned and operated its own system. The whole expert force of the New York Telephone Company is at all time available for the maintenance of the system, which is not possible under City control.

Fire Alarm Box.

10. At the request of the Fire Commissioner I investigated the fire alarm box situation in 1902, and reported to him as to the details of a new fire alarm box for the Borough of Richmond.

Police Headquarters Lighting.

11. At the request of the Police Commissioner I made a detailed report as to the relative advantages of an isolated plant and the Edison Company's service for electric light and power for the proposed Police Headquarters at Centre and Grand streets. This matter involved the complete investigation of two large office buildings having similar characteristics to the proposed Headquarters Building, and it was only after very exhaustive comparisons and conferences with all interests that a report and recommendation was made to the Commissioner.

Manhattan Auxiliary Fire Alarm System.

12. At the request of the Mayor I investigated the technical features of the Manhattan Auxiliary Fire Alarm system to the end of advising him as to some disputed points involving the possible interference and disturbance of the regular fire alarm system by the attachments of the above company. I have considered that this auxiliary system is of great value to the regular fire alarm service, but it should be under the control of the Fire Department rather than operated by a separate company; the latter condition leads to divided authority in the operation of the fire alarm system.

Electric Light Plant for Street Cleaning Department.

13. At the request of the Street Cleaning Commissioner I have advised with him and his engineers on the installation of a small electric light plant on the pier at West Forty-seventh street. At this point much refuse material, such as paper, boxes and other combustible matter is brought each day and is burned in furnaces, thus generating steam which is used for the operation of an engine driving an electric lighting and power dynamo. It is intended to light the dump and pier at Forty-seventh street, as well as Stable B on Fifty-second street, between Eleventh and Twelfth avenues. The engine and dynamo are now in operation and within a short period it is anticipated that the whole system will be working satisfactorily. This is an excellent illustration of the utilization of City refuse to the end of providing electric light and power for the City buildings. Similar installations can be made at the dumps in other parts of the City.

Suggestions as to Future Work.

I would suggest that the work of putting the wires underground be systematically continued in the Borough of Brooklyn as well as the boroughs of Manhattan and The Bronx. The various interests in Brooklyn are quite in accord with the attitude of the Department and have co-operated thoroughly in this work. Attention should be given to the overhead wire situation in the Borough of The Bronx, so that a systematic clearing up of the wires, commencing at the Harlem river, may be established. Third avenue, through which the elevated railroad runs, where both telephone and electric light wires are at present on each side of the street, should be first considered. The telephone subway now exists in this avenue, and the signal wires could be installed without much difficulty. The electric light wires should be removed. Other streets in the lower part of The Bronx should also be recommended for clearing up. The overhead trolley wire and many of the feeder lines of the Union Railway should be examined for the purpose of pointing out where the trolley wires could be better maintained, and the trolley feeders placed underground. Throughout The Bronx the New York Telephone Company is placing its wires underground, and putting its distributing wires in the back yards. Many of its long distance wires will go underground as soon as the result of the operation of the cables replacing the West Side Pole Line has proved to be satisfactory. There is considerable agitation on the part of The Bronx citizens regarding these heavy pole lines, but it will be necessary to await the result of the larger work in the Borough of Manhattan before insisting upon the telephone company removing its lines in The Bronx. It is a matter which will take considerable time and simply depends upon the engineering features of the situation.

Respectfully submitted,
GEORGE F. SEVER.

"IX."

The Honorable the Board of Estimate and Apportionment:

I have the honor to submit herewith the report, transmitted to me by Commissioner Monroe of the Department of Water Supply, Gas and Electricity, of the Special Commission of Experts appointed by him to report upon all questions relating to the City's water supply, and especially as to the sources from which a largely increased supply can most advantageously be obtained. The Commission consisted of Professor William H. Burr and Messrs. Rudolph Hering and John R. Freeman. Their work has been done thoroughly and well, and I take advantage of this opportunity to make my acknowledgments to them for the zeal and industry with which they have carried to completion, in a few months, an inquiry so vital to the welfare of the City. No one can read their report without perceiving that it is the report of men thoroughly familiar with the terms of the problem requiring consideration, and highly competent to deal with it. A study of the report will make it clear to every candid mind at all familiar with the situation that preparation for a largely increased water supply for the City is immediate and urgent. I wish to place myself on record, as earnestly as possible, in support of this view.

Under the most favorable circumstances, it is estimated that it will take five years to bring water from the northern and trans-Hudson watersheds, so as to add the first sixty million gallons per day to the present supply. The report includes special recommendations for all the boroughs, but the creation of a new high service gravity system from the north is the main feature of the report. This water is to be made available to increase the supply for Brooklyn and Queens, as well as for Manhattan and The Bronx. When all the elements of the problem are considered—the magnitude of the work, the fact that it will have to be carried on in various counties of the State, some of them at a long distance from the City, with all the chances of delay that are incidental to such an enterprise—it may easily be nearer ten years than five before the proposed increase of supply is actually available, even if the work of extension should be begun at once. I venture to urge this matter, therefore, upon the incoming authorities of the City, as second in importance to nothing with which they will have to deal.

The sources of increased supply recommended by the Commission are clearly summarized in their own report, and it is not necessary for me to repeat them here. It is enough to point out that the Commission were instructed to confine their inquiry to watersheds lying wholly within the State of New York, as only such watersheds can be availed of with certain freedom from the delays incident to litigation, that they may be taken to the Supreme Court of the United States. It is an interesting circumstance that, up to this time, that tribunal has not yet defined the extent to which one state may use water originating within its borders that flows out of it into another state. This question is now in litigaton before the Supreme Court of the United States, between the states of Colorado and Kansas, growing out of the use by Colorado of interstate water for purposes of irrigation, and, as a result of this litigation, this question may finally be passed upon, but, until this question has been determined by the Supreme Court of the United States, any attempt on the part of The City of New York to use interstate waters would be to invite needless delay and at very costly litigation.

The Commission, in addition to reporting upon the most available sources for an increase of supply for the various boroughs, have dealt with other questions of prime importance. First, with the subject of waste; second, with the subject of pumping; and, third, with the subject of filtration. On the subject of waste, the conclusion of the Commission is:

"That the greatest possible saving by reduction of waste and by decreasing extravagant use will not more than provide for the natural increase in demand (during the construction of the new works) due to the growth of the City, and it may not be sufficient for that; hence the construction of an additional supply should be undertaken at the earliest practical moment."

The methods suggested for the reduction of waste involve important changes in the plumbing regulations of the City, so as to avoid the installation of water in new buildings with hot and cold water pipes side by side.

When such pipes are close together, much water is wasted in the effort to secure either hot water or cold. They also propose an enlarged use of meters, especially in buildings over five stories in height, and urge a system of thorough inspection throughout the city. The actual leakage from defective street mains has been found to be much less than many have supposed. Unless the methods suggested are resorted to, it is evident that the amount of water that can be saved by the stoppage of waste is very limited.

One of the most striking sections of the Commission's report is that which deals with the subject of pumping. Through the development in recent years of the higher territory in Manhattan and The Bronx, about twenty per cent. of the Croton water has now to be pumped, in order to supply buildings on high ground. In Brooklyn and Queens Borough all the water is pumped, and a part of the Brooklyn supply has to be pumped four times.

"Greater New York maintains thirty-two pumping stations, including eighty-six pumps, and its present daily pumpage is 160,000,000 gallons. * * * About 75,000 tons of coal are burned each year, and $12,000 per year expended for oil and petty supplies."

The Commission made detailed suggestions for the concentration of pumping at fewer stations, and for the adoption of the most modern and efficient machinery; as a result of which they estimate that, through an expenditure of about $1,000,000, a saving in the expense account of about $300,000 per year, can be effected. I have seldom seen a more impressive demonstration of the economy of using new machinery, as compared with the machinery of twenty or thirty years ago, than is contained in this section of the report. No part of the report is better worth careful study by those who are to be responsible for the Water Department.

On the subject of filtration, the Commission recommends that arrangements be made, as rapidly as possible, for filtering all the water used in the city, and they point out in detail how this can best be done. The water now in use in the different boroughs is, on the whole, fairly good; but the condition surrounding the sources of supply in some quarters make it more and more difficult to keep it wholly free from contamination. The water, moreover, is often turbid and contains objectionable organic growths. While such foreign matter is not necessarily deleterious to the public health, it makes the water more or less unpalatable. Advances in filtration of public water supplies have been rapidly made in the past few years, and predetermined results can now be obtained. The cost is far from prohibitive, and I know of no expenditure of equal amount which would add so materially to the health and comfort of the City as the filtration of its water supply.

The report of the Commission is naturally limited to the engineering and physical aspects of the problem, and to the probable cost. It seems to me desirable, however, to say a few words as to the financial ability of the City to undertake the proposed extension of its water works. The report of the Commission contemplates an ultimate enlargement of the City supply, from the north, to the extent of an additional 500,000,000 gallons per day. It is estimated that this supply, with all necessary aqueducts, reservoirs, filtering basins, and pumps, can be procured for $100,000,000; and that it will suffice to supply the needs of the City for the next 25 or 30 years. The new aqueduct, to be immediately built, must be built large enough to carry this ultimate quantity. As a consequence, it is estimated that the first addition of 60,000,000 gallons daily will cost $39,000,000; for the further increase of 260,000,000 gallons daily, the additional expenditure necessary will be a further $21,000,000. In other words, for an outlay of $60,000,000 an additional supply equal to the present Croton supply can be had. The remaining $40,000,000 necessary to secure a still further addition of 200,000,000 gallons daily need be spent only from time to time during the next twenty-five years.

As bearing upon the possibility of financing this large improvement, I ask your attention to the fact that a constitutional amendment is to be voted upon next November, which, if it can be adopted, will exempt all water bonds of the City issued after January 1, 1904, from the 10 per cent. debt limitation of the State Constitution. The necessity for this exemption was foreseen by Comptroller Coler, and it is due to his efforts, as I understand, that the proposed amendment received the necessary assent of the first Legislature. When it came up for adoption a second time by the Legislature of last winter, in accordance with the State Constitution, it came into direct conflict with another provision of that instrument, which provides that whenever any question of expenditure for the enlargement of canals is to be submitted to popular vote no constitutional amendment shall be pending. When the Legislature ordered the submission of the canal question to the voters this year, it was at first thought that the pending water debt amendment must fail. A happy suggestion of Corporation Counsel Rives, however, saved the day, and avoided the necessity of commencing again the tedious process of securing the submission to the people of the amendment desired by the City. He pointed out that the Legislature was entirely at liberty in approving the proposed amendment, to order its submission at any election which it pleased. The last Legislature, therefore, gave its approval to the amendment and ordered it to be submitted to the people in November, 1904. I need scarcely point out to the City the importance of securing favorable action upon this amendment when it is submitted to the popular vote:

The present annual income from water revenues for the whole City is substantially		$9,000,000 00
The cost of maintenance is substantially	$2,600,000 00	
Interest	2,600,000 00	
		5,200,000 00
Showing a balance of		$3,800,000 00

There are outstanding, in round numbers, $77,000,000 of water bonds for all parts of the City. Assuming a sinking fund at 1 per cent. for fifty years bonds, the amount annually required for this purpose would be $770,000. This shows a net profit from the present water works of something over $3,000,000, on the basis of present earnings. If it be assumed that the money necessary for the new water works can be borrowed at 3¼ per cent., and that 1 per cent. is necessary to provide a sinking fund, a supply more than equal to that now available for Manhattan and The Bronx can be had for an annual charge of $2,550,000. The figures are:

Interest on $60,000,000 at 3¼ per cent	$1,950,000 00
Sinking Fund provision, $60,000,000, at 1 per cent	600,000 00
Total	$2,550,000 00

In other words, the profit on present earnings from water revenues would more than pay for the new enlargement up to the extent of 320,000,000 gallons. The income from water revenues has increased during the last two years at the rate of $450,000 to $500,000 per annum. There seems to be no reason why the water revenues should not increase at the rate of $450,000 annually, until the maximum supply is distributed. Every such increase would be largely net profit. It may, therefore, be safely assumed that the new water supply will pay for itself as easily as the present water supply does. It will not only do this but it will pay, as the present supply would, for the cost of filtration. The Commission have not had time to go into these figures as regards the present Croton supply; but the cost of the filter plants is included in the cost of increasing the present supply by the amount of 320,000,000 gallons daily, viz., $60,000,000.

I conclude therefore that not only is the need for the enlarged supply immediate and urgent, but also that the new system will be more than self-supporting.

(Signed) SETH LOW, Mayor.

New York, December 18, 1903.

"X."

Department of Water Supply, Gas and Electricity,
Bureau of Electricity for Manhattan and The Bronx,
New York, December 31, 1903.

Hon. ROBERT GRIER MONROE, Commissioner:

Sir—In accordance with your instructions, I have the honor to submit herewith report of the operations of the Electrical Bureau for Manhattan and The Bronx for the year 1903:

High Tension Electric Service.

During 1903 there were constructed 98.910 miles of subways for high tension electric service.

The following is a summary of high tension subway construction in the Borough of Manhattan from the introduction of the subway system in 1886 to December 31, 1903:

	Subways Built. Miles.
1886-1897—Under direction of the Board of Electrical Control	738.991
1898-1901—Under direction of the Department of Public Buildings, Lighting and Supplies	565.657
1902-1903—Under direction of the Department of Water Supply, Gas and Electricity	216.340
Totals to December 31, 1903	1,520.988

Average Yearly Construction.	Subways. Miles.
12 years, 1886-1897	61.583
4 years, 1898-1901	143.412
2 years, 1902-1903	108.170

Low Tension Electric Service.

The length of low tension subways built in 1903 is approximately 331.340 miles.

The following is a summary of construction for low tension electric service since the introduction of the subway system in Manhattan and The Bronx in 1886:

	Subways Built. Miles.
1886-1897—Under direction of the Board of Electrical Control	1,278.969
1898-1901—Under direction of Department of Public Buildings, Lighting and Supplies	482.474
1902-1903—Under direction of Department of Water Supply, Gas and Electricity	555.754
Totals to December 31, 1903	2,317.197

Yearly Averages.

	Miles.
12 years under the Board of Electrical Control	106.581
4 years under the Department of Public Buildings, Lighting and Supplies	120.618
2 years under the Department of Water Supply, Gas and Electricity	277.877

The figures given in the foregoing part of this report on the subject of new construction are summaries for three separate periods, when the work was successively under the direction of the Board of Electrical Control, the Department of Public Buildings, Lighting and Supplies, and the present Department of Water Supply, Gas and Electricity. The subjoined tables give the details, including both high and low tension electric service.

Table I—Showing Length of Subways and Ducts Constructed in 1903, With Classification of Service.

	For the Edison Electric Light Company.		For Electric Light and Power Companies.		For Telephone and Telegraph Companies.	
	Trench.	Duct.	Trench.	Duct.	Trench.	Duct.
Feet	11,932.80	46,094.40	222,849.42	522,246.02	61,401.12	1,749,575.20
Miles	2.26	8.73	42.206	98.910	11.629	331.34

Table II—Total Construction of Subways in Manhattan and The Bronx From Introduction of System in 1886 to December 31, 1903.

	Miles.
Edison, low tension	269.734
Electric light, high tension	1,520.993
Telephone and telegraph	2,061.046
Ventilating pipe	60.110
Grand total	3,911.883

Table III—Showing Total Subway Construction, Classification of Service, Linear Feet and Mileage by Years.

	Edison. Feet.	Edison. Miles.	Electric Light. Feet.	Electric Light. Miles	Telegraph and Telephone. Feet.	Telegraph and Telephone. Miles.	Ventilating Pipes. Feet.	Ventilating Pipes. Miles.
1886	.....	.....	.....	.....	235,644.16	44.629	.....	....
1887	209,011.64	39.585	238,428.65	45.157	958,264.69	181.489	.....	....
1888	22,227.88	4.210	183,353.13	34.725	1,136,970.37	215.336	.....	....
1889	57,327.24	10.858	1,929,962.97	365.523	344,985.58	65.338	77,752.28	14.725
1890	248,973.54	47.155	438,902.05	83.125	944,567.32	178.895	59,187.68	11.210
1891	180,303.14	34.148	274,411.20	51.972	236,835.94	44.855	30,314.65	5.741
1892	166,034.00	31.445	129,852.00	24.593	70,760.82	13.401	8,033.50	1.520
1893	92,577.40	17.534	156,646.10	29.667	574,982.07	108.898	73,776.24	13.973
1894	38,250.47	7.244	107,427.90	20.346	119,662.72	22.662	8,845.40	1.675
1895	59,332.14	11.237	95,781.40	18.140	246,193.39	46.627	16,943.76	3.209
1896	41,247.79	7.812	183,788.50	34.808	152,807.85	28.941	25,598.55	4.847
1897	62,899.57	11.913	163,334.75	30.935	166,940.13	31.618	4,753.63	.900
1898	73,732.44	13.964	120,019.68	22.731	436,548.00	82.686	12,197.00	2.310
1899	52,252.69	9.896	518,728.30	98.244	261,353.20	49.499	.....	....
1900	48,317.28	9.151	261,507.84	49.528	899,944.32	170.444	.....	....
1901	9,262.38	1.754	2,086,417.20	395.154	1,161,493.83	219.979	.....	....
1902	16,357.26	3.093	620,034.58	117.430	1,184,909.70	224.415	.....	....
1903	46,094.40	8.730	522,246.02	98.910	1,749,575.20	331.340	.....	....
Total	1,424,201.26	269.734	8,030,843.72	1,520.993	10,882,439.29	2,061.046	317,402.69	60.110

Table IV.—Permits Issued for Construction of Subways and Subsidiaries Since the Organization of This Bureau, in 1898.

	1898.	1899.	1900.	1901.	1902.	1903.
Subway permits	140	350	320	391	723	830
Subsidiary permits	973	2,950	3,010	2,789	3,861	4,106
Totals	1,113	3,300	3,330	3,180	4,584	4,936

Aerial Wiring.

Good progress is being made in the removal of aerial wires strung from house tops, especially where they cross important thoroughfares. All of them have been removed from Fifth avenue south of Sixty-fifth street, and from Broadway south of Fifty-third street.

During 1903 the Bureau has caused the removal of 204,950 feet, or 38.816 miles of overhead wires from poles and housetops, without any additional expense to the city.

Table V.—Permits Issued in 1903 for Erection of Poles and Stringing Overhead Wires.

For signal wires	2,756
For electric lighting	2,772
For pole lines	270
For resetting dangerous poles	38
For City lighting and lamp posts	136
Total	5,972

Interior Wiring.

Prevention of fires from electric currents and consequently the safety of life and property depend upon faultless construction of interior wiring to the smallest detail. The supervision, inspection and certification of this class of work is therefore a most important part of the duties and responsibilities of the Electrical Bureau, requiring a high degree of mechanical and technical knowledge and training. It is gratifying to be able to state that during 1903 no accidents of any kind have occurred which are traceable to defective installation of interior work which has received certification from this Department and Bureau.

The enormous extent of exterior and interior work in the boroughs of Manhattan and The Bronx for the past year, and the five preceding years, is illustrated by the following statements:

Table VI—Applications, Inspections and Certificates for Interior Wiring, 1898-1903.

	1898.	1899.	1900.	1901.	1902.	1903.
Applications for inspections	11,363	14,949	15,693	15,903	18,443	21,113
Certificates issued	10,842	13,509	14,352	14,226	16,736	20,501
Complaint notices issued	1,564	2,136	3,238	3,396	3,078	5,674
Complaint notices attended to	1,459	1,779	3,095	3,337	2,832	6,122
Work Covered by Certificates.						
Incandescent lamps	394,715	415,625	504,365	440,662	424,232	443,914
Arc lamps	3,840	3,887	6,411	3,123	4,030	7,226
Motors	3,234	4,663	4,743	5,147	5,933	7,393
Horse power of motors	14,999	17,934	17,135	15,302	20,328	25,002.57
Generators	131	94	115	160	166	246
Kilowatt capacity of generators	7,587	11,912	5,475	8,249	60,516	30,653.714
Inspections made	27,367	41,240	50,663	48,832	58,015	70,965

Exterior Wiring.

Permits Issued.	1898.	1899.	1900.	1901.	1902.	1903.
Signal wires	1,485	2,124	2,600	2,416	2,059	2,756
Electric lighting	1,083	1,340	989	983	1,150	2,772
Poles and pole lines	38	93	126	126	224	270
Resetting poles	45	12	30	61	25	38
City lighting	22	38	15	9	61	136

Permits Issued.	1898.	1899.	1900.	1901.	1902.	1903.
Subsidiaries	975	2,950	3,010	2,789	3,874	4,106
Subways	140	350	320	391	723	830
Underground conductors	....	....	3,202	2,027	3,590	4,473
Inspections made	....	9,325	14,522	13,020	14,738	16,015
Total certificates issued	10,842	13,509	14,352	14,226	16,736	20,501
Total complaint notices issued	1,564	2,136	3,238	3,396	3,978	5,674
Total permits issued	3,788	6,907	10,292	8,802	11,706	15,381
Grand total	16,194	22,552	27,882	26,424	32,420	41,556
Total inspections made	....	50,565	65,185	61,852	72,753	86,980

As I have been unable to obtain complete reports from the various companies operating in New York, as to the construction of subways, electrical conductors and devices, the figures given for same in the foregoing tables are approximate, based on the returns which we have received up to December 31, 1903.

Very respectfully,
FRANK E. BROWN, Electrical Engineer.

"XI."

Department of Water Supply, Gas and Electricity,
Borough of Queens,
Long Island City, December 31, 1903.

ROBERT GRIER MONROE, Esq., Commissioner, Nos. 13-21 Park Row, New York City:

Dear Sir—Enclosed please find report of lamps and lighting for the year ending December 31, 1903, also report of Electrical Bureau for the year 1903, complete to December 31.

Yours very respectfully,
G. A. ROULLIER, Deputy Commissioner, Queens.

Report of Electrical Bureau, Borough of Queens, for the year 1903.

Exterior.

First quarter, 325 permits; second quarter, 452 permits; third quarter, 651 permits; fourth quarter, 485 permits. Total, 1,913 permits.

Subway Built During Year 1903.

Trench, 31,420 feet; duct, 211,340 feet.

Interior.

Quarter.	App.	Certif.	Inc.	Arc.	Motors, Horse-power.	Gen. Kilowatts.
First	242	140	3,488	19	12- 275.75	9- 1,743.36
Second	363	420	12,284	55	32- 190.25	15- 636.25
Third	313	303	10,801	60	36- 61.75	3- 139.00
Fourth	281	211	5,911	99	31- 240.42	12- 632.10
Total	1,199	1,074	32,484	233	111- 768.17	39- 3,150.71

Complaints.

	1st Quar.	2d Quar.	3d Quar.	4th Quar.	Total.
Complaints issued	207	354	310	254	1,125
Complaints attended to	196	387	312	373	1,268

Inspections.

First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total.
5,282	6,582	5,711	5,976	23,551

Poles and Wires Removed.

Quarter.	Poles.	Wires (Miles).
First	123	21.49
Second	33	7.68
Third	78	33.25
Fourth	63	44.47
Total	297	106.89

BOROUGH OF QUEENS.

Report of Lamps and Lighting for the Year Ending December 31, 1903, Showing Number of Lamps Burning, Extinguished, Relighted, Etc. (Estimated from December 10 to December 31, 1903).

Name of Company.	What Sort of Lamp.	Candle Power.	No. of Lamps During Year. New Lamps.	Removed or Discontinued.	In Service.	Area of Parks.	Mileage Lighted.	Termination of Contract.
Richmond Hill and Queens County Gaslight Company	Gas	20	.....	.....	454	.....	11.6	Expired
Jamaica Gaslight Company	Gas	20	.....	.....	15	.....	.5	Expired
Newtown Gas Company	Gas	20	.....	.....	2,675	.....	68.	In question
Newtown Gas Company	Gas	20	.....	.....	67	.....	1.8	Expired
Newtown and Flushing Gas Company	Welsbach (gas)	60	8	.....	171	.....	6.	Expired
Jamaica Gaslight Company	Welsbach (gas)	60	.....	.....	57	.....	2.1	Expired
Richmond Hill and Queens County Gaslight Company	Welsbach (gas)	60	.....	.....	48	.....	1.8	Expired
Newtown Gas Company	Welsbach (gas)	60	.....	.....	25	.....	1.	Expired
Welsbach Street Lighting Company of America	Welsbach (gas)	60	.....	.....	16	.....	.5	Expired
Jamaica Gaslight Company	Naphtha	20	.....	2	180	.....	4.7	Expired
Richmond Hill and Queens County Gaslight Company	Naphtha	20	.....	.....	46	.....	1.2	Expired
New York and New Jersey Globe Gaslight Company	Naphtha	20	.....	.....	17	.....	.5	January 1, 1907
Newtown Gas Company	Naphtha	20	.....	.....	662	.....	17.	In question
New York and New Jersey Globe Gaslight Company	Welsbach (naphtha)	60	.....	100	195	.....	10.5	Expired
Jamaica Gaslight Company	Welsbach (naphtha)	60	.....	.....	13	.....	.4	Expired
Welsbach Street Lighting Company of America	Welsbach (naphtha)	60	.....	8	243	7 acres	8.2	Expired
Richmond Hill and Queens County Gaslight Company	Welsbach (naphtha)	60	.....	.....	2	.....	.07	Expired
New York and Queens Electric Light and Power Company	Enclosed alternating arc	2,000	.....	2	1,886	2 acres	231.	Expired
New York and Queens Electric Light and Power Company	Enclosed alternating arc	2,000	.....	.....	225	.....	25.	January 1, 1907
New York and Queens Electric Light and Power Company	Incandescent	25	.....	.....	160	.....	6.	Expired
Total		.....	8	.....	.....	9 acres	397.87	

Note—The Newtown Gas Company was ordered to discontinue 100 of the above naphtha lamps on and after May 1, 1901, and 200 on and after May 5, 1901. The order was ignored by the gas company. Sixty-seven open flame gas lamps and 25 Welsbach gas lamps were lighted by the Newtown Gas Company on quarterly orders. The last order expired on December 31, 1901, but the lamps are still lighted.

Department of Water Supply, Gas and Electricity,
Borough of Queens,
Long Island City, January 26, 1904.

JOHN T. OAKLEY, Esq., Commissioner, Nos. 13-21 Park Row, New York City:

Dear Sir—Inclosed please find two copies of report of transactions of the Electrical Bureau in this borough for the year 1903.

Yours very respectfully,
GEORGE H. CURD, Deputy Commissioner, Queens.

The following is a summary of work done by the Electrical Bureau of the Department of Water Supply, Gas and Electricity, Borough of Queens, during the years 1902 and 1903:

Permits Granted for Exterior Work.

	1902.	1903.	Increase.	Decrease.
Permits granted for telegraph and signal	879	1,140	.....	.....
Permits granted for electric light and power	573	773	.....	.....
Total	1,452	1,913	459	.....

Subway Constructed.

	1902.	1903.	Increase.	Decrease.
Miles of trench	2.42	7.10	4.64	.....
Miles of duct	10.87	43.20	32.63	.....
Miles of cable	4.18	8.18	4.00	.....
Miles of single conductors	1,453.34	2,785.69	1,332.35	.....
Feet of trench	12,988.80	37,488.00	24,499.20	.....
Feet of duct	57,393.60	227,966.00	170,602.40	.....
Feet of cable	22,170.40	43,190.40	21,020.00	.....

Applications Received and Permits Granted for Interior Work.

	1902.	1903.	Increase.	Decrease.
Applications received	1,128	1,199	71	.....
Certificates granted	948	1,074	126	.....
Incandescent lights	33,223	32,484	.....	739
Arc lights	204	233	29	.....
Outlets	241	92	.....	149
Service	5	19	14	.....
Motors	105--678 HP	111--787.17 HP	6--109.17 HP	.....
Generators	27--2759KW	39--3150.71KW	12--391.71KW	.....

Complaints.

	1902.	1903.	Increase.	Decrease.
Complaints issued	932	1,125	193	.....
Complaints attended to	805	1,268	463	.....

Poles and Wires Removed.

	1902.	1903.	Increase.	Decrease.
Poles	336	279	.....	57
Wires, miles	43.74	106.89	63.15	.....

Permits Granted for Exterior Work, Year 1903.

Company.	Quarters First.	Second.	Third.	Fourth.	Total.
New York and New Jersey Telephone Company	160	228	273	190	851
New York and Queens Electric Lighting and Power Company	91	141	151	223	606
Board of Education	2	1	....	....	3
Brooklyn Heights Railroad Company	7	3	6	1	17
Queens Borough Gas and Electric Company	18	30	12	7	67
Western Union Telegraph Company	1	3	1	9	14
Bowery Bay Electric Light and Power Company	20	8	....	....	28
New York and Queens County Railway Company	9	4	3	13	29
Police Department	2	1	....	....	3
New York and North Shore Railway Company	....	1	....	1	2
Knickerbocker Telephone and Telegraph Company	....	1	....	1	2
New York and Rockaway Beach Railway Company	....	1	....	....	1
Fire Department	....	20	176	5	201
United States Life Saving Service	....	....	1	....	1
Long Island Railroad Company	....	....	....	5	5
Sea-board Telegraph and Telephone Company	....	....	....	2	2
Total	310	442	623	457	1,832
Subway Permits.					
Subways.					
New York and New Jersey Telephone Company	1	....	8	2	11
Subsidiaries.					
New York and New Jersey Telephone Company	3	3	7	15	28
New York and Queens Electric Light and Power Company	2	....	6	5	13
Queens Borough Gas and Electric Company	....	1	....	....	1
Conductors.					
New York and New Jersey Telephone Company	8	5	4	2	19
New York and Queens Electric Light and Power Company	1	....	3	4	8
Queens Borough Gas and Electric Company	....	1	....	....	1
Total	325	452	651	485	1,913

For What Purpose.

	Quarters First.	Second.	Third.	Fourth.	Total.
Erect poles	5	7	49	16	77
Erect poles and wires	10	35	42	37	124
Erect poles, wires and City lamps	1	1	1	2	5
Replace poles and wires	34	33	37	34	138
Transfer poles and wires	3	8	11	6	28
Transfer poles, wires and City lamps	3	4	2	6	15
Reset poles	3	10	19	12	44
Erect guy stubs	1	6	3	1	11
Remove poles and wires	6	2	3	5	16
String wires	235	322	446	318	1,321
String wires and hang lamps	9	14	10	20	53
Subway	1	....	8	2	11
Subsidiaries	5	4	13	20	42
Conductors	9	6	7	6	28
Total	325	452	651	485	1,913

Permits, telegraph and signal	1,140
Permits, electric light and power	773
	1,913

Report of Subway Constructed.

Miles of trench	7.10
Miles of duct	43.20
Miles of cable	8.18
Miles of wire in single conductors	2,785.69
Feet of trench	37,488.00
Feet of duct	227,966.00
Feet of cable	43,190.40

Report of Complaints Sent to Various Companies and Contractors.

Complaints Issued.

First quarter	207
Second quarter	354
Third quarter	310
Fourth quarter	254
Total	1,125

Complaints Attended To.

First quarter	196
Second quarter	387
Third quarter	312
Fourth quarter	373
Total	1,268
Complaints not attended to	376

Interior Work.

Quarter.	Applications Received.	Certificates Granted.	Incandescent Lights.	Arc Lights.	Outlets.	Service.	Motors in H. P.	Generators in K. W.
First	242	140	3,488	19	41	11	12—275.75	9—1,743.36
Second	363	420	12,284	55	37	5	32—190.25	15— 636.25
Third	313	303	10,801	60	..	3	36— 61.75	3— 139.00
Fourth	281	211	5,911	99	14	..	31—240.42	12— 632.10
Total	1,199	1,074	32,484	233	92	19	111—768.17	39—3,150 71

Total number of applications left over for work not completed	343

Inspections, Interior and Exterior.

First quarter	5,282
Second quarter	6,582
Third quarter	5,711
Fourth quarter	5,976
Total	23,551

Report of Poles and Wires Removed by the Different Companies Operating in the Borough of Queens During the Year 1903.

	Poles.	Miles Wires.
New York and New Jersey Telephone Company	51	96.38
New York and Queens Electric Light and Power Company	218	10.01
Queens Borough Gas and Electric Company	....	....
New York and Queens County Railway Company	2	....
Knickerbocker Telephone and Telegraph Company	7	....
Western Union Telegraph Company	4	.50
Postal Telegraph Company	....	....

	Poles.	Miles Wires.
Jamaica Water Supply Company	....	....
Police Department	....	....
Fire Department	....	....
New York Telephone Company	....	....
Seaside Light, Heat and Power Company	....	....
Bowery Bay Electric Light and Power Company	....	....
North Beach Electric Light and Power Company	....	....
New York and North Shore Railway Company	....	....
Brooklyn Heights Railroad Company	3	....
Ocean Electric Railway Company	....	....
New York and Rockaway Beach Railway Company	....	....
De Kalb Avenue and North Beach Railroad Company	....	....
Coney Island and Brooklyn Railroad Company	....	....
Sea Board Telephone and Telegraph Company	....	....
Department of Highways	10	....
U. S. Life Saving Service	2	....
Total	297	106.89

"XII."

Office of the Deputy Commissioner Water Supply, Gas and Electricity,
Of The City of New York, for the Borough of Richmond,
New Brighton, December 31, 1903.

Hon. ROBERT GRIER MONROE, Commissioner Water Supply, Gas and Electricity,
No. 21 Park Row, New York City:

Dear Sir—I herewith respectfully submit a report of the operations of the Division of Water Supply, Gas and Electricity which has charge of the water supply located in the Borough of Richmond, for the year ending December 31, 1903.

Respectfully,
GEO. S. SCOFIELD,
Deputy Commissioner Water Supply, Gas and Electricity.

Appropriation, Salaries, Office Deputy Commissioner.

Amount of appropriation for the year 1903		$6,900 00
Transferred to appropriation Pumping Station, Salaries and Supplies		650 00
Total		$6,250 00
Amount of vouchers certified to Comptroller		6,199 88
Balance of appropriation December 31, 1903		$50 12

Appropriation Pumping Station, Salaries and Supplies.

Amount of appropriation for the year 1903		$7,100 00
Transferred from appropriation Salaries, Office Deputy Commissioner		650 00
Total amount of appropriation		$7,750 00
Vouchers certified to Comptroller to date	$6,516 28	
Balance due on contract for coal	711 00	
Approximate weekly payrolls	160 00	
Approximate amount of orders	250 00	
Total expenditures		7,637 28
Balance of appropriation December 31, 1903		$112 72

Appropriation, Rental of Fire Hydrants.

Amount of appropriation for the year 1903	$30,052 50
Transferred to appropriation "Supplies and Contingencies"	600 00
Total amount appropriation	$29,452 50
Vouchers certified to Comptroller to date	14,230 00
Balance of appropriation December 31, 1903	$15,222 50

Statement of Water Rents and Charges Collected and Deposited for the Year Ending December 31, 1903.

Annual frontage and extra rate	$452 18
Penalties on deferred payments and annual rates	5 68
Meter rates for water supplied in buildings	4,315 93
Charges for water supplied for building purposes	30 00
Total	$4,803 79
Money received	$4,403 41
On deposit	30 00
Bills unpaid	370 38
Total	$4,803 79
Cash paid over to City Chamberlain	$4,403 41
On deposit	30 00
Total	$4,433 41

Number of connections, 43.

Statement of Service of Well and Force Pumps, Coal Consumption, etc., for the Year Ending December 31, 1903.

Amount of coal used, 507,588 gross tons.
Amount of cylinder oil used, 56.56 gallons.
Amount of machine oil used, 45 gallons.
Amount of waste used, 112 pounds.

Well Pumps.

10-inch well No. 5, hours	2,540 1-2
10-inch well No. 6, hours	3,191 1-12
10-inch well No. 7, hours	2,666 5-6
10-inch well No. 8, hours	2,089 1-2
Total hours	10,487 11-12

Worthington Force Pumps.

No. 1, hours	1,913
No. 2, hours	1,948 1-3
Total hours	3,861 1-3

Number of gallons drawn from wells and pumped to stand-pipe, from January 1, 1903, to December 31, 1903:

No. 1, gallons	21,336,303.52
No. 2, gallons	25,253,137.77
Total gallons	46,589,441.29

Hours of Service.

Enginemen, pumping station, hours	4,748
Stoker, hours	2,914
Laborers, hours	5,830
Mason, hours	108

Expenditures.

Salaries of Enginemen	$2,067 19
Salary of Stoker	729 96
Wages of Laborers	1,457 50
Wages of Mason	54 00
Coal	2,068 34
Waste	7 74
Oil	81 64
Total	$6,466 37

Cost of production, 13.88-100 cents per thousand gallons.
Average daily consumption, 127,642.30 gallons.
Laborers employed in clearing, grubbing, etc., 2,048 hours.

Contract Statement, Including Contracts in Progress, Contracts Made, Contracts Completed.

Title of Works or Supplies and Name of Contractor.	Date of Contract.	Date of Expiration of Contract Time.	Estimated Cost.
For furnishing labor and materials and building a storehouse and boiler-house at the Tottenville Pumping Station, Philip Wolf & Sons	July 9, 1903	Oct. 19, 1903	$5,372 00

Contract completed.

Contract Statement for the Year 1903, Including Contracts in Progress, Contracts Made, Contracts Completed.

Title of Works or Supplies and Name of Contractor.	Date of Contract.	Date of Expiration of Contract Time.	Estimated Cost.
For furnishing, delivering and storage 450 gross tons (2,240 pounds to a ton) of No. 1 pea size white ash anthracite coal at the Pumping Station, Tottenville, George W. DuBois	May 11, 1903	Feb. 6, 1904	$1,777 50

Statement of lengths of water mains in use December 31, 1903, lengths added during the year ending December 31, 1903, with number of stop cocks and hydrants:

Sizes of Mains in Use December 31, 1903—8 inches, 8,182.75; 6 inches, 21,795.85; 4 inches, 8,211.90; total, 38,190.50.

Stop Cocks in Use December 31 1903—8 inches, 18; 6 inches, 28; 4 inches, 15; total, 61.

Hydrants.

Supplied by the Staten Island Water Supply Company	586
Supplied by the Crystal Water Company, of Edgewater	451
Supplied by the South Shore Water Works Company	18
Supplied by the Tottenville Water Works	77
Total	1,132

ANNUAL REPORT OF MOUNT PROSPECT LABORATORY FOR 1903.

Hon. ROBERT GRIER MONROE, Commissioner, Department of Water Supply, Gas and Electricity, Nos. 13-21 Park row, New York City:

Dear Sir—The following report of work done in the laboratories of the Department of Water Supply, Gas and Electricity during the year 1903, is herewith submitted:

Since the beginning of the year 1903 the laboratory work has been conducted under three divisions:

1. That which has related to the boroughs of Manhattan, The Bronx, Queens and Richmond.
2. That which has related to the Borough of Brooklyn.
3. That which has been done for the Commission on Additional Water Supply.

The work for Manhatan, The Bronx, Queens and Richmond has been carried on under the direction of Mr. Nicholas S. Hill, Jr., Chief Engineer. The work for Brooklyn has been carried on as heretofore under the direction of Mr. I. M. de Varona, Chief Engineer of the Borough of Brooklyn, Department of Water Supply, Gas and Electricity, while that for the Commission on Additional Water Supply represents the work of the Department of Chemistry and Biology of that Commission. This report, save the part which relates to the work for the Commission on Additional Water Supply, is abstracted from the reports which have been rendered to Chief Engineers Nicholas S. Hill, Jr., and I. M. de Varona. Three laboratories have been in operation as described below:

Laboratories.

Until the middle of the year 1902 no systematic analyses of the water supplies of the Borough of Manhattan had been made by this Department. At that time the work was begun under the direction of Commissioner J. Hampden Dougherty, but it was confined to the distribution system and did not cover the sources of supply. During the year 1902 all of the analytical work was carried on at Mount Prospect Laboratory, in Brooklyn. In January of the present year you directed that the scope of this laboratory should be extended to cover all the water supplies of New York City, and also the investigations which were about to be made by the Commission on Additional Water Supply. This increased work necessitated the enlargement of the present laboratory and the construction of a branch laboratory on the Croton watershed. This last was rendered necessary by the fact that it was impossible to transmit samples from the various reservoirs of the Croton system to Mount Prospect Laboratory, in Brooklyn, in time to secure a satisfactory bacteriological examination. In connection with the work of the Additional Supply a second branch laboratory was temporarily located at Poughkeepsie, New York.

The Mount Prospect Laboratory is equipped for making complete analyses of water and for testing such supplies as coal, lubricating oil, cement, etc. It consists of a chemical laboratory for general work, a chemical laboratory devoted especially to water analyses, a bacteriological laboratory, a small isolated laboratory for special work, a photometer room for gas analyses and a cement laboratory, besides an office, shipping room and storage rooms. These laboratories are coordinated and are especially adapted for the various divisions of the work, and fully equipped with the most improved forms of chemical and biological apparatus.

The laboratory at Katonah is equipped simply for making physical and biological analyses of water, and is virtually a field laboratory. It was built during the early part of the year, but was not ready for use until June. It is located in the Village of Katonah, about 50 miles from New York City, and occupies a central position on the watershed. Samples may be conveniently sent to it from all reservoirs. It has the further advantage of being located near the office of the Assistant Engineer, who has charge of the sanitary inspection of the watershed, and it has been the intention to make the two departments go hand in hand, the one to supplement the work of the other.

The laboratory work for the Department may be considered under two headings:

1. That which relates to water analysis.
2. Analyses of a general character.

Water Analyses.

The regular analyses of the various sources of supply for the five boroughs; the official testing of the filter plants at Baiseley's and Springfield, Brooklyn Borough; and the special work for the Commission on Additional Water Supply has necessitated an unusually large number of water analyses during the past year.

The following is a summary of the analyses of water made during the year:

	Number of Samples of Water Examined.
Brooklyn	4,779
Manhattan	2,870
Queens	162
Bronx	155
Richmond	112
Commission on Additional Water Supply	9,945
Total number of samples examined	18,023

Schedule of Samples.

The schedule for the collection of samples for analysis has been practically as follows:

Daily samples have been collected from the terminus of the Croton Aqueduct at the One Hundred and Thirty-fifth Street Gate House and at a tap in City Hall Square. These samples have been analyzed physically and bacteriologically. Weekly samples have been collected from the outlets of the distribution reservoirs in Central Park, from the Williamsbridge Reservoir, from the One Hundred and Thirty-fifth Street Gate House and from the tap in City Hall Square. All the above samples have been sent to Mount Prospect Laboratory in Brooklyn, and the weekly samples have been given a complete sanitary analysis. Weekly samples have also been collected from all the storage reservoirs on the Croton watershed and from a number of places on the Croton river and its tributaries. These samples have been sent to the branch laboratory at Katonah and examined bacteriologically and microscopically. Once a month samples from these reservoirs have been sent to Mount Prospect Laboratory for chemical analysis. In the case of all the storage reservoirs the samples were collected both at the surface and at the bottom near the effluent gate house. In the case of the ground water supplies in the boroughs of Queens and Richmond samples have been collected once a month or once a quarter, as occasion seemed to require, and given a complete sanitary analysis at Mount Prospect Laboratory.

In Brooklyn daily samples have been taken from the terminus of the aqueduct at Ridgewood and from the tap in Mount Prospect Laboratory in Brooklyn. These samples have been examined physically and bacteriologically. Weekly samples have been collected from the distribution reservoirs and from other taps in the city and given a complete sanitary analysis. Weekly samples have been collected from all the surface supplies and examined physically and bacteriologically, and complete chemical examinations were made each month.

Samples from the driven well stations have been analyzed monthly or quarterly, as occasion seemed to require.

The schedules have been so arranged that those waters which are open to contamination receive the greatest attention, and those parts of the analysis which are of special importance are much more frequently made. The following table shows the division of the work along these lines, and represents the division of the water analyses made during the year 1903:

Number of physical examinations	16,018
Number of chemical examinations (complete)	1,429
Number of chemical examinations (partial)	7,734
Number of microscopical examinations	3,055
Number of bacteriological examinations	6,172
Number of bacteriological examinations (coli tests)	4,674

In the above classification the physical analysis includes the determination of temperature, color, odor and turbidity, and gives a knowledge of the water from an aesthetic standpoint. Excepting in special cases, the partial chemical analysis is for the chlorine and the various forms of nitrogen present in the water. The complete chemical analysis includes the determinations for nitrogen as free and albuminoid ammonia, nitrites, nitrates and the total solids, organic and volatile matter, fixed solids, hardness, alkalinity, iron and chlorine. These figures indicate the quality of the water from a chemical standpoint.

The microscopical examination shows the number and kind of microscopic plants and animals in the water, with especial reference to their causation of bad tastes and odors in the water.

The bacteriological examination shows the number of bacteria per cubic centimeter in the water, and the coli tests give some indication as to the presence of germs of disease.

Inspections.

Unusual attention has been given to the inspection of the Brooklyn watershed during the past year in connection with the preparation of the Revised Map of Nuisances. All of the watersheds were visited by the Biologist and the various nuisances classified according to their estimated danger to the supply. Repeated inspections were also made by members of the Laboratory staff of the Italian camp located at Elmont, near the head waters of Simonson's pond, and to the camp at Wantagh, near the infiltration gallery now under construction.

Inspections have also been made of all the sources of supply on the Croton watershed and on the Bronx and Byram watersheds. The sanitary inspections other than those which relate to the Brooklyn supply have been made by the Assistant Engineer, Mr. Fred. K. Betts, who has charge of that Department under the direction of Mr. Nicholas S. Hill, Jr., Chief Engineer.

Tables and Reports.

The results of water analyses are kept on file in Mount Prospect Laboratory and weekly reports on the quality of the water in Brooklyn and Manhattan are sent to the Chief Engineers. In addition to these reports diagrams have been prepared showing the daily fluctuations in the physical and sanitary character of the Croton water and the Ridgewood water as it enters the City. A weekly report showing the results of analyses made at the Katonah Laboratory has also been presented. No regular reports have been made in regard to the quality of the water in the boroughs of Queens and Richmond, but special reports have been made from time to time. In case of sudden changes in the character of the water entering the City, caused, for instance, by rainfall or by the sudden development of organisms in the Central Park or Ridgewood reservoirs, special reports have been made in regard to these facts.

General Analytical Work.

Chemical analyses of the general supplies for the Department have been called for more and more frequently from year to year. Constructive material, boiler scales and compounds, paints, coal, brass and bronze fittings are bought on specifications subject to analyses. Over two thousand analyses of sand were made during the year, most of which were for the Commission on Additional Water Supply. The samples were analyzed either to determine their efficiency for filtration purposes or in connection with experimental work on soil physics. Many samples of sand have also been analyzed in connection with the filter plants now being constructed at Hempstead and Forest Stream, to determine the character of local deposits of sand.

The following is a resume of the general analytical work of the laboratories during the year 1903:

General Analytical Work.

Sand samples examined	2,050
Cement samples examined	66
Coal samples examined	38
Oil samples examined	33
Brass and bronze examined	14
Boiler compounds examined	7
Boiler waters examined	16
Boiler scales examined	8
Magnesia asbestos examined	17
Paint samples examined	3
Alum and soda ash examined	4
Asphalt samples examined	3
Special tests and experiments	67

Sand Analysis.

Sands for filtration purposes are analyzed chemically to determine the amount of lime, iron, magnesia and albuminoid ammonia present, all of which constituents should be slight in amount. They are also analyzed mechanically to determine the effective size and the uniformity coefficient.

Cement Analysis.

The Cement Laboratory is fitted with a Fairbanks testing machine, large soapstone tanks for setting the briquettes, and a moist closet with moveable glass shelves, a hooded bath for the hot water and steam tests and glass-topped mixing tables. Various chemical tests are applied to the samples of cement received. First-class Portland cements are subject to the following specifications:

Specific Gravity—

The specific gravity shall not be less than 3.00.

Fineness—

Not more than 1 per cent. by weight shall be retained by a No. 50 sieve of No. 35 Stubbs wire gauge; not more than 10 per cent. by weight shall be retained by a No. 100 sieve of No. 40 Stubbs wire gauge; not more than 25 per cent. by weight shall be retained by a No. 200 sieve of No. 45 Stubbs wire gauge.

Soundness—

Pats of neat cement one-half inch thick and about 3 inches in diameter, with thin edges, shall show no signs of disintegration, distortion or change of volume after an exposure of from one to twenty-eight days after "hard set" in water having a temperature of between 60 degrees and 70 degrees Fahrenheit, nor after being subjected to the hot test. For the hot test the pats will either be allowed to set in moist air, and then kept in boiling water for a period of from six to twenty-four hours, or after they have been made for twelve hours, they will be exposed to steam at about 208 degrees Fahrenheit for four or five hours. Any additional tests which the Engineer may require to fully insure an absence of free lime shall be made.

Time of Setting—

The cement shall require at least thirty minutes to develop the "initial" set, the same being determined as the time when the neat cement bears, without indentation, a wire of 1-12 inch diameter, loaded to weigh one-fourth pound, the temperature being between 60 and 70 degrees Fahrenheit.

Tensile Strength—

Briquettes of cement, one inch square in cross section, shall develop the following tensile strength:

Neat Cement—

One day (in water after hard set), 200 pounds.
Seven days (one day in air, six days in water), 550 pounds.
Twenty-eight days (one day in air, twenty-seven days in water), 675 pounds.

Mortar (1 to 3)—

Seven days (one day in air, six days in water), 200 pounds.
Twenty-eight days (one day in air, twenty-seven days in water), 275 pounds.
Standard qualities of sand shall be used for mortar; it shall be of such fineness that it will pass a No. 20 sieve and be caught on a No. 30 sieve.

Analysis—

All cement received will be subject to chemical analysis for determining the ingredients and their relative proportions. None of the cement shall show more than 3 per cent. magnesia (MgO), nor more than 1.5 per cent. sulphuric acid (SO_3). The requirements in other particulars will be fixed by the Engineer, and will be such as to insure a high grade of cement, freedom from adulterants in injurious proportions, and uniformity in the various shipments. Other things being equal, preference will be given to cements which have shown by their record to steadily gain in strength for a long period.

Coal Analysis.

The coal received is tested by means of the Mahler bomb, and determinations are made of heating power, moisture, volatile sulphur and ash. The following are the specifications for coal used in the Department:

The total amount of volatile sulphur present in a coal shall at no time exceed one and one-half (1½) per cent.

The anthracite coal shall have a heating power of at least 12,500 B. T. U. (6,944 calories).

The bituminous coal shall not contain less than 13,500 B. T. U. (7,500 calories).

Oil Analysis.

Quite a variety of oils are used in the Department, chiefly for lubricating the pumping machinery. The general chemical laboratory is fitted with apparatus for determinations of flash point, viscosity, freezing point, etc. The following are the specifications for the various oils used.

Cylinder Oil—

1. The cylinder oil must be a high grade mineral oil, suitable for pressures of 160 pounds per square inch, and entirely free from all soaps, alkalies, water, tar and resinous matter. It must have a neutral reaction at 70 degrees Fahrenheit, and should not yield more than three-tenths of one per cent. (0.3 per cent.) acid when digested with boiling alcohol. The oil must not vary in quality, and must feed freely through Detroit or Standard lubricators, and should keep the cylinders and valves lubricated and free from "groaning" or "chattering," when supplied through the lubricators in reasonably small quantities. It should conform with the following physical requirements:

Baume gravity at 60 degrees Fahrenheit, 25.0 degrees to 26.0 degrees.
Flash point not less than 550 degrees Fahrenheit, by Tagliabue's open tester.
Viscosity at 210 degrees Fahrenheit, from 180-200, by Tagliabue's viscosimeter.
Temperature of solidification, below 32 degrees Fahrenheit.

Marine Engine Oil—

2. This oil must be a good lubricating mineral oil, free from fats, acids, soaps, alkalies and all water, tar, animal and resinous matter. It must conform to the following physical requirements:

Baume gravity at 60 degrees Fahrenheit, from 23.5 degrees to 24.5 degrees.
Flash point, from not less than 430 degrees Fahrenheit, by Tagliabue's open tester.
Viscosity, at 70 degrees Fahrenheit, from 350 to 500, by Tagliabue's viscosimeter.
Temperature of solidification below 25 degrees Fahrenheit.

Dynamo Engine Oil—

3. The dynamo engine oil must be a good lubricating mineral oil for high-speed engines, and must be free from fats, acids, soap, alkalies and all water, tar

and animal and resinous matter. It must conform with the following physical requirements:

Baume gravity at 60 degrees Fahrenheit, from 27 degrees to 29 degrees.

Flash point, from not less than 430 degrees Fahrenheit, by Tagliabue's open tester.

Viscosity, at 70 degrees Fahrenheit, from 350 to 450 by Tagliabue's viscosimeter.

Castor Oil—

4. This oil should be double-refined castor oil, suitable for the journals on beam engines, and for the cross-heads and T-heads on high pressure pumps. It must be entirely soluble in absolute alcohol.

Lard Oil—

5. The oil required must be of the quality commercially designated as "Prime Lard Oil." It must be made from prime lard, and must stand a cold test of 45 degrees Fahrenheit. It must contain not more than one and one-half (1½) per cent. of free acid, and must be free from all foreign matter. The oil will be used in the machine shop and for illuminating purposes.

Kerosene Oil—

6. The kerosene oil must be a standard quality illuminating oil, with a flash point above 130 degrees Fahrenheit, and a burning point above 150 degrees Fahrenheit, by Tagliabue's open tester. It shall not have a color which exceeds 50 on the platinum scale as used in water analysis.

Magnesia Asbestos.

Two qualities of magnesia asbestos coating for boilers are employed, the 40 per cent. mixture and the 85 per cent. mixture. The 85 per cent. mixture should be of long fibre asbestos and magnesia and contain no lime, sulphate or other impurities.

Alum.

Alum is used as a mechanical precipitant in the filter plants at Springfield and Jameco, Brooklyn Borough. The following specifications are required:

Sulphate of Alumina—

The sulphate of alumina shall be properly packed in barrels and shall be in lumps varying in size from one (1) inch to four (4) inches on their largest dimensions.

The composition of the sulphate of alumina shall be as follows:

It shall contain no free acid.

It shall contain not less than 17.5 per cent. of alumina, soluble in water.

It shall contain not more than 3-10 of 1 per cent. of ferrous oxide (soluble).

It shall contain not more than 4-10 of 1 per cent. of insoluble matter.

Soda Ash.

Soda ash is at times used in the machanical filter plants to increase the alkalinity of the water so that efficient purification may be had when the water is low in carbonates. It is also used in the treatment of boilers,

The soda ash shall be 58 per cent. (Na_2O) New Castle test, in powdered form, on a basis of 48 per cent.

Hydrant Fittings.

All materials used in the manufacture of hydrants shall conform to the following requirements:

Bronze—

All bronze shall be of the following composition:

Copper, 88 per cent., ±2 per cent.
Tin, 10 per cent., ±1 per cent.
Zinc, 2 per cent., ±1 per cent.

Composition or Brass—

All composition or brass shall be of the following percentages:

Copper, 85 per cent., ±2 per cent.
Zinc, 6¼ per cent., ±½ per cent.
Tin, 5½ per cent., ±½ per cent.
Lead, 2½ per cent., ±½ per cent.
Impurities, ¾ per cent., or less.

Tensile Strength of Bronze and Composition—

All bronze, composition or brass shall be good, tough metal, free from flaws and other imperfections, and shall have a tensile strength of not less than 30,000 pounds per square inch of section.

Quality of the Water.

BOROUGH OF MANHATTAN.

The croton water as delivered to the consumers may be characterized as safe from a sanitary standpoint, noticeably colored and slightly turbid, with an odor usually vegetable and occasionally aromatic, grassy or fishy, reasonably soft, a good boiler water and generally satisfactory for industrial purposes. The chief complaints that have been made against the water have been due to its physical qualities, such as turbidity, color and odor. The turbidity of the water represented by the samples collected at the One Hundred and Thirty-Fifth Street Gatehouse, has varied more or less from day to day, sometimes being as low as 1 on the silica scale, and at other times running as high as 25. The average turbidity from January to September, 1903, was 5. By the time the water reaches City Hall Square the turbidity has been reduced to an average of about 3. The color of the water has ranged from 16 to 30 on the platinum scale, and averaged about 24. When the color is muddy, higher than 20, it becomes noticeable to the consumer. The odor of the water has not been as noticeable during the present season as it has sometimes been in the past. The water always has a slight vegetable taste and odor, due to the presence of the same substances which give the water its color. At other times, and especially during the summer, it has an odor variously described as aromatic, grassy or fishy, due to the presence of microscopic organisms. These organisms are found in nearly all of the storage reservoirs, but it is in those reservoirs recently constructed where the growths obtain their greatest development. At times the water as it leaves the aqueduct at One Hundred and Thirty-fifth Street Gatehouse has an odor which can be definitely traced to these organisms, but it is in the reservoirs at Central Park where the disagreeable odors are chiefly acquired. This fact is very evident from the table above mentioned, but it may be observed more readily by comparing the figures for the month of September alone. During that month the water, as it left the aqueduct at the One Hundred and Thirty-fifth Street Gatehouse, contained only 1,700 microscopic organisms per cubic centimeter, while the water at the outlets of the reservoirs in Central Park contained from 2,229 to 5,290 per cubic centimeter. During the passage of the water through the distribution pipes many of the organisms are destroyed, so that during September the average number at City Hall Square was only 933. The most important organisms present at that time were anabena and aphanizonemon, organisms which give rise to a grassy and moldy odor. The present season, however, has not been favorable for the development of troublesome microscopic organisms, so that the odor of the water in the city has been rather better than usual. The sanitary character of the water is best shown from the analytical results, by the number of bacteria per cubic centimeter and the presence of bacillus coli, the intestinal germ. The average number of bacteria in the tap water in City Hall Square from January 1 to October 1, was 370, but the numbers vary at different times from 80 to 700 per cubic centimeter. The large numbers have occurred after heavy rains, and are probably caused by the surface wash on the watershed. The test for bacillus coli has been made upon three different quantities of water, and the results for the first nine months of the year were as follows: One per cent. of the samples gave positive tests when tested with .1 cubic centimeter; 3.5 per cent. with 1 cubic centimeter, and 9 per cent. with 10 cubic centimeters. It is a matter of record that the typhoid fever death rate of New York City compares most favorably with that of any other large city in this country, the ordinary death rate being about twenty per 100,000 inhabitants.

BOROUGH OF THE BRONX.

The quality of the water supplied to the Borough of The Bronx has been generally satisfactory. The supply is naturally slightly better than that of the Croton water. During the present year no extensive growths of organisms in Williamsbridge Reservoir have appeared.

BOROUGH OF BROOKLYN.

Tables have been prepared showing the average quality of the water yielded by the Ridgewood watershed during the year 1903, as compared with previous years. It will be seen from them that there has been a very material reduction in the amount of chlorine and hardness in the water, due to the fact that less water has been drawn from the brackish wells than ordinarily. The unusually large rainfall during the present year has also tended to reduce the chlorine in the water, and has made possible the practical shutting down of some of the well stations. The color of the water has been slightly higher than usual, on account of the heavy rainfall at certain seasons, but it has not been high enough to cause any general comment in the city.

The number of samples which gave positive tests for bacillus coli have increased considerably. The figures given for this year, however, are not strictly comparable with those of previous years, partly because the figures represent but eleven months of the year (the month of December usually giving few positive results), and partly because of a slight change in the method, which was inaugurated the first of the year 1903. According to the method now practiced, tests for bacillus coli are made in 3 quantities of water, .1 c. c., 1 c. c. and 10 c. c. The results of the daily samples collected at the Ridgewood Pumping Station show that 4.4 per cent. of the samples contained bacillus coli in .1 c. c.; 17.3 per cent. in 1 c. c., and 28.7 per cent. in 10 c. c. The average number of bacteria in the water at Ridgewood has been about normal, the average for the year being 343 per c. c.

The character of the water in the city, as compared with previous years, is shown by tables which have been prepared. The same remarks which apply to the water at Ridgewood apply equally as well to the tap water. Of the daily samples tested at Mount Prospect Laboratory, 2.2 per cent. gave positive tests with .1 c. c.; 9.6 per cent. with 1 c. c., and 19.2 per cent. with 10 c. c.

The present year has not been favorable for the development of microscopic organisms in the distribution reservoirs, and except in Mount Prospect Reservoir no very extensive growths have occurred. The average number of microscopic organisms in the tap water has accordingly been somewhat lower than usual, and the odor of the water has been correspondingly somewhat better. In spite of the increase in the tests for bacillus coli (the reasons for which have just been mentioned), there is no reason to believe that the sanitary condition of the water has been less satisfactory during the past year than during the preceding years covered by the analyses. It is believed, however, that the new method of testing for bacillus coli presents in truer light the frequency with which this organism is found in the water than the former methods.

BOROUGH OF QUEENS.

The various water supplies of the Borough of Queens are all taken from underground sources, and from a sanitary standpoint the analyses show them all to be satisfactory. Some of these waters, however, are very hard and unsatisfactory for boiler use and for general industrial purposes. The supplies in this borough have not differed materially from past years.

BOROUGH OF RICHMOND.

The water supplies in the Borough of Richmond have been given particular attention. They are all derived from underground sources and may all be considered as satisfactory from a sanitary standpoint. The waters are all hard, however, and that supplied by the West New Brighton Station, Staten Island Water Supply Company, is not only very hard, but contains a large amount of salt and a considerable amount of iron in solution. These qualities quite unfit it for the general uses of a public water supply. The iron precipitates from the water on standing, and is likely to cause trouble in the laundry by depositing iron rust on the clothes. The large amount of chlorine present makes the water most unsatisfactory for boiler uses. Personal inspections have been made of all the Staten Island water supplies during the past year.

Special Investigations.

During the past year a number of special problems have been studied on the Croton watershed, among which may be mentioned the following:

On April 16 and 17 a test of the operation of the electrozone plant at Brewster was made to determine whether or not it was effectively purifying the sewage of the Town of Brewster. The results were incorporated in a special report presented to Chief Engineer Hill. They appeared to corroborate tests which were made a number of years ago by the Department of Health, which showed that the sewage was being effectively disinfected by the application of the "electrozone." Samples of sewage taken after treatment showed it to be almost, but not quite, sterile. On allowing this treated sewage to stand in the laboratory, however, a secondary decomposition took place. Samples of mud taken from the tile drains at the lower end of this system were tested for bacillus coli, and in every case gave negative results.

A special investigation was made to determine the efficiency of the sewage disposal plant at the Montefiore Home for Consumptives in Bedford. These results were not wholly favorable to the system, and in view of the importance of the subject it will probably be necessary to collect samples regularly from the stream into which the sewage effluent indirectly finds its way.

Several series of analyses have been made to determine the character of the water in Lake Mahopac with reference to its sanitary quality and the possibility of its being filtered to remove the effects of pollution. Inspections of available filter sites were also made and many samples of local deposits of sand analyzed chemically in order to determine their fitness for filtration purposes. The results of this investigation have not yet been completed.

A number of samples have been collected from the region above the Sodom reservoir in order to determine the effect upon the quality of the water of the swamps in that locality and to ascertain the effects of the limestone deposits in the same region. A series of samples has also been collected from the streams and brooks below the Village of Mt. Kisco, where the sources of pollution are probably more various than elsewhere on the watershed.

Statistical studies have also been made to ascertain the density of population on the watershed above the various sources of supply. The results show that, taken as a whole, the population over the watershed is about 52 persons per square mile, but it varies in different sections from 24 to 390 per square mile, being the lowest in the upper portions of the watershed and highest in those portions nearest the City. On the watershed of the Bronx and Byram system the population is about 34 per square mile, but comparison of existing populations with previous census records shows that, taken as a whole, the population on the watersheds are not increasing, but have, in fact, diminished during the last ten or twenty years. This has been due, no doubt, to the extensive purchase of property by the City for the protection of the supply, and when one views the constant decrease in the death rate from typhoid fever in The City of New York during the past fifteen years the wisdom of this course cannot be doubted. Whether or not additional purchases should be made, however, or whether, in the future, reliance should be placed upon the filtration of the water are questions which must be decided according to local conditions.

Filter Tests.

The mechanical filters which were erected at Springfield and Baiseley's during the years 1901 and 1902, and which failed to comply with the specifications when first tested, have been reconstructed and again submitted for tests. The plant at Springfield was started up about September 1, and that at Baiseley's about October 1, 1903. During the preliminary operation of the plant at Springfield, namely, from August 31 to September 21, samples of the raw water and the filtered water were analyzed daily in order to make sure that the filtered water was safe for use. The first period of the official test was begun on September 1, and continued until October 4. During this period there occurred a severe storm which dislodged immense quantities of oscillaria from the sides and bottom of the pond, making the water unfit for fil-

tration, and presenting such conditions as would, in the ordinary operation of the filter, lead to its temporary disuse. Under these conditions it was not surprising that the filter failed to comply with the required specifications. It was found that when the number of bacteria in the raw water was below 2,500 the filtered water averaged 164 bacteria per c. c., which considerably exceeded the limit of 75 set by the specifications. Also, that when the number of bacteria was above 2,500 the average percentage removal was 95 per cent. when it should have been 97 per cent.

The failure of the filter to comply with the specifications was due to the growth of bacillus violaceus in the underdrain and lower portions of the sand beds, which caused the filtered water to contain larger numbers of bacteria than the specifications allowed. The real efficiency of the filter during this period was better than the bacterial counts would indicate. The results of the tests for bacillus coli in the filtered water were invariably negative.

Opportunity was given the contractor to sterilize the sand beds and underdrains and to get the filter ready for another test period, which began on November 2, and continued until November 15. During the second period the filter complied with the specifications. The results of the physical and chemical analyses were all satisfactory. The average number of bacteria in the raw water when below 2,500 was 887 per c. c., and the corresponding number in the filtered water was 37 per c. c., which is less than one-half the limit set by the specifications. The average number of bacteria in the raw water when above 2,500 was 11,123, while the corresponding number in the filtered water was 4, indicating a percentage removal of 99.5 per cent. The third period of the filter test began on November 30, 1903.

Experiments on Soil Pollution.

In connection with the infiltration galleries now being constructed, considerable attention was given to the possible danger of their pollution by water passing through the soil. The results of these experiments have been already reported. They include many bacteriological examinations of sand collected at various places and at different depths, with a view to showing the decrease in the number of bacteria downwards from the surface. From the results obtained, it was quite evident that the effects of surface pollution under the conditions existing on Long Island do not extend below 6 or 8 feet, and the results appear to corroborate the more extensive investigations recently made in England upon the same subject.

The subject of subsoil pollution was also given attention, and some experiments were begun at Elmont, where the Italian camp was located, in co-operation with the Engineering Department of the Commission on Additional Water Supply. A number of driven wells were sunk to different depths about the latrine there used, and frequent samples of water were taken for analysis. While these samples indicated a high degree of pollution, the number of positive tests for bacillus coli was surprisingly small. Most of these wells were only 10 feet distant from the source of pollution, but some of the wells were 50 feet distant, and in these wells also positive tests for bacillus coli were occasionally obtained. The experiments were, unfortunately, interrupted before they were completed, but from the results obtained it is a fair inference that the soil of Long Island is very favorable for removing the effects of subsurface pollution, and it seems probable that with the ordinary fine sands and with low velocity of flow water would be rendered practically safe for use by passing through a horizontal distance of about 25 feet.

Respectfully submitted,

G. C. WHIPPLE, Biologist in Charge.
DANIEL D. JACKSON, Chief Chemist.

Mount Prospect Laboratory, December 31, 1903.

COMMISSIONERS OF THE SINKING FUND OF THE CITY OF NEW YORK.

Proceedings of the Commissioners of the Sinking Fund, at a Meeting Held in Room 16, City Hall, at 2.30 o'clock P. M., *on Tuesday, October 21, 1904.*

Present—George B. McClellan, Mayor; Edward M. Grout, Comptroller; Patrick Keenan, Chamberlain, and John T. McCall, Chairman, Finance Committee, Board of Aldermen.

The minutes of the meeting held September 28, 1904, were approved as printed.

On motion, John Korb, Jr., was unanimously elected Temporary Secretary.

The Comptroller brought up the matter of the request of the Commissioner of Docks, that he be authorized to entertain an application from Mr. John H. Starin to sublet a portion of the East Thirty-second Street Pier to the American Ice Company, laid over at the last meeting.

Mr. O. B. Gould, representing Messrs. Clark & Allen; Mr. J. F. Keany, representing the New York, Pennsylvania and Long Island Railroad Company, and a representative of the American Ice Company were heard at length in regard to the matter.

Discussion followed.

The matter was again laid over and the Secretary directed to request Mr. Starin to attend the next meeting of the Board for the purpose of furnishing such information as it desires, and that the American Ice Company be requested to inform the Board what rental it proposes to pay to Mr. Starin.

The following communication was received from the Commissioner of Docks, relative to a lease to the New York Central and Hudson River Railroad Company of certain trackage rights between Thirty-third and Thirty-seventh streets, on the North river. (See page 661):

NEW YORK, October 4, 1904.

Hon. N. TAYLOR PHILLIPS, *Secretary of the Sinking Fund Commission:*

SIR—Under date of July 15, 1904, a communication was forwarded to you, requesting authorization for the granting of a lease of the West Thirty-sixth Street Pier, with track privileges thereon, and on the new made land under the control of this Department along the marginal street between Thirty-third and Thirty-seventh streets, on the North river, to the New York Central and Hudson river Railroad Company, to commence October 8, 1904, and to be for a term of ten years, with two renewal terms of ten years each.

On July 27, 1904, a resolution was approved by the Commissioners of the Sinking Fund authorizing a lease of the pier on the terms suggested by this Department, but the privilege of maintaining tracks was eliminated and left for further consideration as to the rental to be charged therefor.

The rental of $500, suggested by this Department for the track privilege, was determined upon after careful consideration of the matter, and in view of the large rental paid by the New York Central and Hudson River Railroad Company for the lease of the pier at the foot of West Thirty-sixth street, as compared with the rentals paid for other piers in the vicinity. A communication has now been received from the New York Central and Hudson River Railroad Company to the effect that the report made by the Comptroller's Engineer, with reference to the rental to be charged for the track privileges was based, to some extent, on the understanding that the proposed tracks were to be laid wholly upon City property, while, as a matter of fact, large portions thereof west of the westerly line of Twelfth avenue are on private property owned or leased by the company, and that the total number of linear feet of track to be laid along the marginal street west of the westerly line of Twelfth avenue is 1,020 feet. The letter from the company further states that the laying of the tracks is absolutely necessary, in order to permit the use of the West Thirty-second Street Pier by the Pennsylvania, New York and Long Island Railroad Company in connection with the construction of the tunnel across the North river at that point.

In view of the above facts I hereby recommend that the Commissioners of the Sinking Fund adopt a resolution authorizing me to include in the lease of the West Thirty-sixth Street Pier, authorized by the Commissioners of the Sinking Fund July 27, 1904, the privilege of maintaining tracks as outlined in the letters forwarded to you by me under dates of July 12 and July 15, 1904, an additional rental of $500 per annum to be charged for the privilege.

Yours respectfully,
MAURICE FEATHERSON, *Commissioner.*

In connection therewith the Comptroller presented the following report of the Engineer of the Department of Finance:

OCTOBER 15, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—The Commissioner of Docks and Ferries, in communication of October 4, 1904, to the Commissioners of the Sinking Fund, renews his request for a lease to the New York Central and Hudson River Railroad Company of certain trackage rights between Thirty-third and Thirty-seventh streets, on the North river, which was originally contained in a proposed lease to that company for the pier at the foot of West Thirty-sixth street.

Since the original application you have conferred with Mr. Ira A. Place, General Attorney for the New York Central and Hudson River Railroad Company, and stated to me the price for the privilege which you would be willing to recommend to the Board of Estimate and Apportionment, should the matter come before that Board from the Board of Aldermen.

The only part of the marginal street which is open is between Thirty-third and Thirty-fourth streets, and the trackage rights which the railroad company desires to procure cover the crossings of Thirty-fourth, Thirty-fifth and Thirty-sixth streets and several turnouts across Twelfth avenue into the adjoining blocks.

The number of feet of track in each of the streets is approximately as follows:

	Feet.
Marginal street, between Thirty-third and Thirty-fourth streets	370
Across Thirty-fourth street	200
Across Thirty-fifth street	545
Across Thirty-sixth street	320
Within the lines of Twelfth avenue	2,175
About	3,610

—which is very close to the figures given by the Engineer of the railroad company, to wit, 3,550 feet.

As the Board of Aldermen has jurisdiction over Twelfth avenue and possibly the crossings of the streets named, it will be seen that only a small part of the total privilege asked for would be contained in the lease from the Dock Department.

Mr. Place, in a communication under date of October 3, 1904, after your conference with him, advised you that he intended to apply to the Dock Department so that the matter might be brought to the attention of the Commissioners of the Sinking Fund, and in reply thereto you recommended that he secure the entire privilege through the Board of Aldermen, rather than by two instruments, one through the Dock Department and one through the Board of Aldermen.

I am therefore of the opinion that no action should be taken in this matter except through the Board of Aldermen and the Board of Estimate and Apportionment, when it can be dealt with in one instance.

Respectfully,
EUG. E. McLEAN, Engineer.

Approved:
Edward M. Grout.

Copies of the correspondence in the case are herewith inclosed.

Mr. Ira Place, representing the New York Central and Hudson River Railroad Company, appeared before the Board and was heard in regard to the matter.

Discussion followed, whereupon the Comptroller moved that the matter be referred to the Corporation Counsel for an opinion as to the proper method of procedure.

Further discussion was had, and the Chairman of the Finance Committee, Board of Aldermen, moved that the recommendation of the Commissioner of Docks be approved.

The motion of the Comptroller, to refer the matter to the Corporation Counsel, having preference, a vote was taken thereon, which resulted in a tie, the Mayor and Comptroller voting in the affirmative, and the Chamberlain and the Chairman of the Finance Committee, Board of Aldermen, voting in the negative. A vote was then taken on the motion of the Chairman of the Finance Committee, Board of Aldermen, to approve the recommendation of the Dock Commissioner, which resulted in a tie, the Mayor and Comptroller voting in the negative and the Chamberlain and the Chairman of the Finance Committee, Board of Aldermen, voting in the affirmative. The Mayor then called for a vote on the original proposition of the Comptroller, to refer the matter to the Corporation Counsel, which again resulted in a tie vote, the Mayor and Comptroller voting in the affirmative and the Chamberlain and Chairman of the Finance Committee, Board of Aldermen, voting in the negative. The Mayor then declared the matter killed.

(See further action at end of meeting.)

The following communication was received from the Commissioner of Docks, relative to a lease of 160 feet of space on the south side of the pier and approach at the foot of West Thirty-ninth street, North river, to M. J. Sheehy:

NEW YORK, October 11, 1904.

N. TAYLOR PHILLIPS, *Esq., Secretary, Commissioners of the Sinking Fund:*

SIR—I am in receipt of an application from M. J. Sheehy for a lease of 160 feet of space on the south side of the pier and approach at the foot of West Thirty-ninth street, North river, for a term of ten years, with the privilege of one renewal term.

Mr. Sheehy has for some time past occupied under a permit a berth 135 feet in length at the inner end of the south side of the pier and approach at the foot of West Thirty-ninth street, North river, and has paid rental therefor at the rate of $1,200 per annum. He desires the use of an additional 25 feet, and this space is at the present time unoccupied and is available for leasing.

The Consolidated Ice Company has a ten years' lease of the entire West Forty-sixth Street Pier, North river, at a rental of $2,500 per annum.

The Silver Point Ice Company has a lease for a period of five years covering 150 feet of the pier at the foot of West Fifty-fourth street, North river, at a rental of $1,800 per annum.

The New York Butchers Dressed Meat Company has a ten years lease, with the privilege of a renewal term of ten years, covering 150 feet of the pier foot of West Thirty-ninth street, North river, at a rental of $1,575 per annum.

Michael Egan has a ten years' lease of 200 feet of the pier foot of West Thirty-ninth street, North river, used for dumping board purposes, at a rental of $1,250 per annum.

I hereby respectfully recommend and request that the Commissioners of the Sinking Fund approve of and authorize the granting of a lease to M. J. Sheehy covering 160 feet of space on the southerly side of the pier and approach at the foot of West Thirty-ninth street, North river, with the privilege of maintaining an ice bridge, scales and tally house thereat, the lease to be for a term of ten years from the first day of the month following the date of approval by the Commissioners of the Sinking Fund, at a rental of $1,800 per annum, payable quarterly in advance to the Cashier of this Department, the lease to provide for one renewal term of ten years, at an advance of five per cent. per annum over the rental for the first term, the remaining terms and conditions of the lease to be similar to those contained in leases of wharf property now in use by this Department.

The berth to be occupied under the proposed lease will commence at a point 605 feet from the outer end of the pier and will run thence easterly along the southerly prolongation of the pier and approach a distance of 160 feet.

Yours respectfully,
MAURICE FEATHERSON, Commissioner.

I see no objection to the approval of the lease as proposed.
EUG. E. McLEAN, Engineer, Department of Finance.

October 14, 1904.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Commissioners of the Sinking Fund hereby approve of and consent to the execution by the Commissioner of Docks, of a lease to M. J. Sheehy, of 160 feet of space on the southerly side of the pier and approach at the foot of West Thirty-ninth street, North river, with the privilege of maintaining an ice-bridge, scales and tally house thereat; the lease to be for a term of ten years, from the first day of November, 1904, at a rental of eighteen hundred dollars ($1,800) per annum, payable quarterly in advance; the lease to provide for one renewal term of ten years at an advance of five per cent. per annum over the rental for the first term; the remaining terms and conditions to be similar in every respect to those contained in leases of wharf property now in use by the Department of Docks and Ferries, and as recommended by the Commissioner of Docks in communication dated October 11, 1904.

Which was unanimously adopted.

The following communication was received from the Commissioner of Docks relative to a lease of lands under water, between Two Hundred and First and Two Hundred and Second streets, on the Harlem river, Borough of Manhattan, to the Harlem Contracting Company:

NEW YORK, October 11, 1904.

N. TAYLOR PHILLIPS, Esq., *Secretary, Commissioners of the Sinking Fund:*

SIR—An application has been received by me from the Harlem Contracting Company for a lease of lands under water, between Two Hundred and First and Two Hundred and Second streets, on the Harlem river, in the Borough of Manhattan. The space applied for is now occupied by that company under a temporary permit, at a rental of $200 per annum. The space applied for extends from the southerly line of Two Hundred and First to the northerly line of Two Hundred and Second streets, and from mean high water to the bulkhead-line, and contains an area of 9,300 square feet.

The Third Avenue Railroad Company holds a lease of 26,275 square feet of land under water, between Two Hundred and Sixteenth and Two Hundred and Eighteenth streets, on the westerly side of the Harlem river, for a term of ten years, with two renewal terms of ten years each, at a rental of $2,250 per annum for the first term, and at an advance of 10 per cent. per annum in the rental for each renewal term. This rental for the first term is at the rate of four cents per square foot per annum.

The Fort George Coal and Lumber Company holds a lease of 359 feet of crib bulkhead in Sjerman's Creek, with a return of 80 feet, on the Harlem river, built by this Department, at a rental of $800 per annum for the first ten years, the lease granting the right of renewal for a further term of ten years. This bulkhead is within a block of the land under water occupied by the Harlem Contracting Company, and is referred to in order to show the rental value of wharf property in the locality.

I hereby recommend that the Commissioners of the Sinking Fund approve of and authorize the granting of a lease of the said land under water to the Harlem Contracting Company for a term of ten years from the first day of the month following the date of approval by the Commissioners of the Sinking Fund, at a rental of four cents per square foot, amounting to $372 per annum, payable quarterly in advance to the Cashier of this Department, the lease to contain the privilege of two renewal terms of ten years each, at an advance in the rental of 10 per cent. per annum on each renewal term, the remaining terms and conditions of the lease to be similar in every respect to those contained in leases of wharf property now in use by this Department.

Yours respectfully,
MAURICE FEATHERSON, Commissioner.

In connection therewith the Comptroller presented the following report of the Engineer of the Department of Finance:

OCTOBER 14, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—In reply to the communication of the Dock Commissioner, dated October 11, 1904, recommending that the Commissioners of the Sinking Fund approve of a lease to the Harlem Contracting Company, for certain lands under water, between the southerly side of Two Hundred and First street and the northerly side of Two Hundred and Second street, on the westerly bank of the Harlem river, for a term of ten years, with the privilege of two renewals of ten years each, at a rental of four cents per square foot per annum for the first term, and advancing 10 per cent. per annum for each of the renewal terms, I would report as follows:

Up to the present time but little improvement, if any, has been made along the Harlem river at this point, but the opening of the Rapid Transit Railway and the construction of the bridge across the Harlem river at Two Hundred and Seventh street will, in my opinion, materially change the condition of affairs, and in consequence I suggest to you the propriety of limiting the lease to one renewal term of ten years, making a total of twenty years instead of thirty.

The lease to the Third Avenue Railroad Company referred to by the Commissioner, the terms of which are practically the same as those proposed for the present lease, has been in existence eight years of the first term of ten, and it would therefore appear to me that the price fixed for this first renewal term will be more nearly equitable for the price to be fixed for the proposed lease, to wit: 4.4 cents per square foot per annum, instead of 4 cents, as proposed.

A lease to the Manhattan Railway Company, covering the land under water near One Hundred and Fifty-ninth street, is at the rate of 4.5 cents per square foot per annum, and expires in 1907. The renewal term of ten years expires in 1917, being at the rate of 5.6 cents per square foot per annum.

I would therefore recommend that the Commissioners of the Sinking Fund consider the advisability of changing the terms proposed, making the lease for a term of ten years, with the privilege of one renewal of ten years, the price for the first term to be $410 per annum, and for the renewal term at an advance of 10 per cent., or $450.

Respectfully,
EUG. E. McLEAN, Engineer.

Approved:
E. M. GROUT, Cmptroller.

The Dock Commissioner, who was present, was interrogated in regard to the matter. Discussion followed.

On motion, the matter was referred back to the Commissioner of Docks.

The following communication was received from the Fire Department relative to a renewal of the lease of premises located on Rockaway avenue, near Flatlands avenue, in the Borough of Brooklyn:

BOROUGH OF MANHATTAN, October 6, 1904.

To the Honorable Commissioners of the Sinking Fund:

GENTLEMEN—This office is in receipt of a communication from the Deputy Commissioner, boroughs of Brooklyn and Queens, dated the 27th ult., stating that the lease of premises on the east side of Rockaway avenue, near Flatlands avenue, Canarsie, Borough of Brooklyn, occupied by Engine Company No. 157, would expire October 1, 1904, and recommending that your Honorable Commission be requested to authorize the renewal of the same for a period of one year from said date, under the terms of the lease which has expired (annual rental of $700), to which Mr. Leonard Ruoff, the lessor, has agreed. I have the honor to request that a lease of the premises in question be authorized as recommended by the Deputy Commissioner, boroughs of Brooklyn and Queens, and to inclose copy of his communication and of the consent of Mr. Ruoff, by his attorney, David Teese.

Respectfully yours,
NICHOLAS J. HAYES, Commissioner.

Approved for renewal upon the same terms and conditions as contained in existing lease.

MORTIMER J. BROWN,
Appraiser of Real Estate in charge of Bureau.

OCTOBER 14, 1904.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Comptroller be and is hereby authorized and directed to execute a renewal of the lease to the City, from Leonard Ruoff, of premises located on Rockaway avenue, near Flatlands avenue, in the Borough of Brooklyn, for the use of the Fire Department, for a term of one year from October 1, 1904, at an annual rental of seven hundred dollars ($700), payable quarterly, otherwise upon the same terms and conditions as contained in the existing lease—the Commissioners of the Sinking Fund deeming the said rent fair and reasonable, and that it would be for the interests of the City that such lease be made.

Which was unanimously adopted.

The following communication was received from the President of the Borough of Queens, relative to a renewal of the lease of four lots of land on the east side of Twentieth street, between Twelfth avenue and Albert place, in the Village of College Point:

LONG ISLAND CITY, September 28, 1904.

To the Honorable, the Sinking Fund Commission, City of New York:

GENTLEMEN—Mr. Cassidy desires me to request you to renew the lease of Wm. H. Morrell for premises in the Town of Flushing, Third Ward, Borough of Queens, known as Lots Nos. 77, 78, 79 and 80, Block 3, subject to the same conditions and provisions as contained in the lease bearing date August 8, 1902.

Respectfully yours,
GEO. S. JERVIS, Secretary to President.

N. B.—The premises above referred to are occupied by the Bureau of Street Cleaning as a disposal plant, and lease therefor expires on October 1, 1904.

Approved for renewal for a term of two years from October 1, 1904, with the privilege of renewal for two years; otherwise upon the same terms and conditions as contained in the existing lease. Lessor, William H. Morrell.

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

September 30, 1904.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Comptroller be and is hereby authorized and directed to execute a renewal of the lease to the City from William H. Morrell, of four lots of land on the east side of Twentieth street, between Twelfth avenue and Albert place, in the Village of College Point, on which are erected crematories and other buildings, owned by the City, for the use of the President of the Borough of Queens, for a term of two years from October 1, 1904, at an annual rental of two hundred dollars ($200), payable in advance; otherwise upon the same terms and conditions as contained in the existing lease—the Commissioners of the Sinking Fund deeming the said rent fair and reasonable and that it would be for the interests of the City that such lease be made.

Which was unanimously adopted.

The Comptroller presented the following report and offered the following resolution relative to the assignment of the property owned by the City between One Hundred and Thirty-ninth and One Hundred and Fortieth streets, and extending from Fifth avenue to the Harlem river, Borough of Manhattan, to the Department of Water Supply, Gas and Electricity:

SEPTEMBER 15, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—The Commissioner of the Department of Water Supply, Gas and Electricity, in a communication under date of July 18, recommended the purchase by the City, for the use of his Department as a pipe yard, the property bounded by the north side of One Hundred and Fortieth street, the east side of Fifth avenue, the south side of One Hundred and Forty-first street and along the Harlem river ship canal, between One Hundred and Fortieth and One Hundred and Forty-first streets, and transmits a report from the Consulting Engineer, Mr. George W. Birdsall, of the Department of Water Supply, Gas and Electricity.

I do not see the necessity of the City acquiring the block requested by the Commissioner, for the reason that the City is the owner of the block just south of the one mentioned, extending from Fifth avenue to the Harlem ship canal, and from One Hundred and Thirty-ninth to One Hundred and Fortieth street, and I would respectfully recommend that the Commissioners of the Sinking Fund adopt a resolution assigning to the Commissioner of the Department of Water Supply, Gas and Electricity, during the pleasure of the Board, the property owned by the City, being the block bounded by Fifth avenue, the Harlem ship canal, East One Hundred and Thirty-ninth and East One Hundred and Fortieth streets, subject to the use by the Commissioner of the Department of Street Cleaning of a certain part of the premises for Departmental purposes.

Respectfully submitted for approval,

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

Approved:
EDWARD M. GROUT, Comptroller.

Resolved, That the property owned by the City, being the block bounded by Fifth avenue, the Harlem ship canal, East One Hundred and Thirty-ninth street and East One Hundred and Fortieth street, be and the same is hereby assigned to the Department of Water Supply, Gas and Electricity, subject to the use by the Department of Street Cleaning of a certain part of said premises for Departmental purposes, said assignment to continue during the pleasure of the Commissioners of the Sinking Fund.

The report was accepted and the resolution unanimously adopted.

The Comptroller presented the following report and offered the following resolution, relative to an amendment to resolution authorizing a lease of premises at the junction of Manhattan street, Amsterdam avenue and One Hundred and Twenty-sixth street, Borough of Manhattan, for the use of the Eleventh District Municipal Court:

OCTOBER 7, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—The Commissioners of the Sinking Fund at a meeting held February 29, 1904, authorized a lease of the second floor of building to be built on the triangular plot of ground at the junction of Manhattan street and Amsterdam avenue and One Hundred and Twenty-sixth street, Borough of Manhattan, for the use of the Eleventh District Municipal Court, from the New York Operating Company.

William E. Stillings, attorney for the lessors, in a communication under date of October 1, 1904, requests that the resolution be amended, for the following reasons:

"My client found that he could procure additional property in the rear of the proposed building and by so doing was able to erect a much larger building than that first contemplated. He then discovered that he could let the 5,000 square feet on the second floor to the City for $5,000 per annum."

As the designated 5,000 square feet, which has been accepted by the City, is only a portion of the second floor, I would respectfully recommend that the Commissioners

of the Sinking Fund amend the resolution by inserting the words "a portion of" so as to read "of a portion of the second floor of building to be built," etc.

Respectfully submitted for approval,

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

Approved:
EDWARD M. GROUT, Comptroller.

Resolved, That the resolution adopted by this Board at meeting held February 29, 1904, authorizing a lease of the second floor of building to be built on the triangular plot of ground at the junction of Manhattan street and Amsterdam avenue and One Hundred and Twenty-sixth street, Borough of Manhattan, for use as a court-room by the Eleventh District Municipal Court, be and the same is hereby amended by inserting the words "a portion of" before the words "the second floor of the building," etc., so that the premises to be leased will be described as "a portion of the second floor of the building to be built on the triangular plot of ground at the junction of Manhattan street and Amsterdam avenue and One Hundred and Twenty-sixth street, Borough of Manhattan."

The report was accepted and the resolution unanimously adopted.

The following communication was received from the Police Department relative to a renewal of the lease of premises on Nineteenth avenue, between Benson and Bath avenues, in the Borough of Brooklyn:

NEW YORK, October 1, 1904.

To the Commissioners of the Sinking Fund, No. 280 Broadway, City:

GENTLEMEN—The Police Commissioner this day

Ordered, That the Commissioners of the Sinking Fund be and are hereby respectfully requested to authorize the Comptroller to execute renewal of lease from Margaret McGrath of premises on Nineteenth avenue, between Bath and Benson avenues, in the Borough of Brooklyn, for station-house and stable for the Seventieth Precinct, for one year from January 1, 1905, at $750 per annum, the covenants to be the same as in the existing lease.

Very respectfully,
WM. H. KIPP, Chief Clerk.

Approved for renewal upon the same terms and conditions as are contained in the existing lease.

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Comptroller be and is hereby authorized and directed to execute a renewal of the lease to the City, from Margaret McGrath, of premises on Nineteenth avenue, between Benson and Bath avenues, in the Borough of Brooklyn, for the use of the Police Department, for a term of one year from January 1, 1905, at an annual rental of seven hundred and fifty dollars ($750), otherwise upon the same terms and conditions as contained in the existing lease—the Commissioners of the Sinking Fund deeming the said rent fair and reasonable and that it would be for the interests of the City that such lease be made.

Which was unanimously adopted.

The following communication was received from the Police Department relative to a renewal of two leases of premises in the Post Office Building, situated on Main street, Westchester, Borough of The Bronx:

NEW YORK, October 1, 1904.

To the Commissioners of the Sinking Fund, No. 280 Broadway, City:

GENTLEMEN—The Police Commissioner this day

Ordered, That the Commissioners of the Sinking Fund be and are hereby respectfully requested to authorize the Comptroller to execute renewal of leases of premises known as the Post Office Building, Westchester, from William Henderson (1) of one store on the ground floor and eight rooms on the second floor, at the rate of $1,800 per annum, for one year from January 1, 1905; (2) of one store on the ground floor, adjoining the above described store, and the entire third floor, at the rate of $1,100 per annum, for one year from January 1, 1905, for station-house purposes for the Thirty-eighth Police Precinct, the covenants to be the same as in existing leases.

Very respectfully,
WM. H. KIPP, Chief Clerk.

Approved for renewal upon the same terms and conditions as are contained in the present existing lease.

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Comptroller be and is hereby authorized and directed to execute renewals of leases to the City of the following described premises, occupied by the Police Department:

1. The store floor on the ground floor and eight (8) rooms on the second floor of premises known as the Post Office Building, situated on Main street, Westchester, Borough of The Bronx, for a term of one year from January 1, 1905, at an annual rental of eighteen hundred dollars ($1,800), otherwise upon the same terms and conditions as contained in the existing lease; William Henderson, lessor.

2. The store on the ground floor of the building known as the Post Office Building, on the westerly side of Main street, Westchester, Borough of The Bronx, northerly and adjacent to the store occupied by the Police Department in the said building, and the entire third floor in the said building, for a term of one year from January 1, 1905, at an annual rental of eleven hundred dollars ($1,100), payable quarterly, otherwise upon the same terms and conditions as contained in the existing lease; William Henderson, lessor.

—the Commissioners of the Sinking Fund deeming the said rents fair and reasonable and that it would be for the interests of the City that such leases be made.

Which was unanimously adopted.

The following communication was received from the Police Department relative to a renewal of the lease of stable in the rear of lot adjoining No. 1874 Myrtle avenue, Glendale, Borough of Queens:

NEW YORK, October 4, 1904.

To the Commissioners of the Sinking Fund, No. 280 Broadway, City:

GENTLEMEN—The Police Commissioner this day

Ordered, That the proceedings of October 1, 1904, relative to renewal of lease from Henry J. Glasser, be amended so as to read as follows:

Ordered, That the Commissioners of the Sinking Fund be and are hereby respectfully requested to authorize the Comptroller to execute renewal of lease from Henry J. Glasser of premises corner of Myrtle and Harmon avenues, Glendale, Queens, being a stable on rear of lot, for the purposes of the Eighty-third Sub Police Precinct, for one year from January 24, 1905, at $360 per annum, the covenants to be the same as in existing lease.

Very respectfully,
WM. H. KIPP, Chief Clerk.

Approved for renewal upon the same terms and conditions as contained in the existing lease.

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Comptroller be and is hereby authorized and directed to execute a renewal of the lease to the City, from Henry J. Glasser, of stable in the rear of lot adjoining No. 1874 Myrtle avenue, Glendale, Borough of Queens, for use of the Police Department, for a term of one year from January 24, 1905, at an annual rental of three hundred and sixty dollars ($360), and on the same terms and conditions as contained in the existing lease—the Commissioners of the Sinking Fund deeming the said rent fair and reasonable and that it would be for the interests of the City that such lease be made.

Which was unanimously adopted.

The following communication was received from the Police Department, relative to a lease of premises No. 17 Leonard street, Borough of Manhattan:

NEW YORK, October 15, 1904.

To the Honorable Commissioners of the Sinking Fund:

GENTLEMEN—The Police Commissioner this day

Ordered, That the Commissioners of the Sinking Fund be and are hereby respectfully requested to authorize the Comptroller to execute a lease from Charles I. Campbell and John J. Campbell, No. 18 Leonard street, of premises No. 17 Leonard street, in the Borough of Manhattan, for the purpose of providing quarters for the stabling of horses used in regulating street traffic and patrol wagon service for the Eighth Precinct, for the term of three years, at the rental of $2,500 per annum the terms and conditions of said lease to be as follows:

The names of the lessors are Charles I. Campbell and John J. Campbell, No. 18 Leonard street, trustees of the estate of John Campbell.

The property is a three-story and cellar brick building, No. 17 Leonard street, Borough of Manhattan. Building, 25 by 86 feet. Lot, 25 by 91 feet.

The term of the proposed lease is three years, with the privilege of renewal for three years at same rental.

The rental is $2,500 per annum, payable quarterly.

All repairs and alterations to be made by the Police Department.

Owner does not pay water rent.

Owner does not pay for light, heat or janitor service.

Necessity for lease—For the purpose of providing quarters for the stabling of horses used in regulating street traffic and patrol wagon service for the Eighth Precinct Station.

The premises recommended are the most reasonable that can be secured in the neighborhood for the purpose desired.

The appropriation from which the rental is to be paid is sufficient to cover it for the balance of the year 1904. If this request is acceded to application will be made to the Board of Estimate and Apportionment for an appropriation for the year 1905.

Very respectfully,
WM. H. KIPP, Chief Clerk.

In connection therewith the Comptroller presented the following report and offered the following resolution:

OCTOBER 18, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—Regarding the premises No. 17 Leonard street, near Hudson street, Borough of Manhattan, a lease of which is asked for by the Police Department for the purpose of providing quarters for the stabling of horses used in regulating street traffic and for patrol wagon service of the Eighth Precinct Station, I have the honor to report as follows:

This is an old three-story and cellar brick stable, 25 by 86 feet, on a lot 25 feet 1¼ inches by 91 feet, and is at present in bad repair.

The Police Department requests a lease for three years at an annual rental of $2,500 a year, payable quarterly, with the privilege of renewal for three years additional upon the same terms and conditions, the City to make all alterations and repairs, to pay water rents and all other expenses except taxes.

As a result of a conference with Charles I. Campbell, one of the trustees of the estate of John Campbell, the owners of the property, he has consented to a reduction of the rental to $2,100.

The property is assessed at $21,000, and is, in my opinion, fairly worth from $28,000 to $30,000.

This is the only stable in the immediate neighborhood, and is next door to the Eighth Precinct Station-house. I am of the opinion that the rental of $2,100 for the property for a three-year lease, with a renewal clause for a like period, is fair and reasonable, and I would therefore respectfully recommend that the Commissioners of the Sinking Fund adopt a resolution authorizing a lease of the premises No. 17 Leonard street, Borough of Manhattan, for the purpose of providing quarters for the stabling of horses used in regulating street traffic and patrol wagon service for the Eighth Precinct, for a term of three years from the date of occupation, with the privilege of renewal for a further period of three years, at an annual rental of $2,100, payable quarterly, the City to make all alterations and repairs, to pay the water rent, to pay for light, heat and janitor service, the owner to pay the taxes. Lessors, Charles I. Campbell and John J. Campbell, as trustees of the estate of John Campbell, deceased.

Respectfully submitted for approval,

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

Approved:
EDWARD M. GROUT, Comptroller.

Resolved, That the Corporation Counsel be and is hereby requested to prepare a lease to the City from Charles I. Campbell and John J. Campbell, as trustees of the estate of John Campbell, deceased, of premises No. 17 Leonard street, Borough of Manhattan, for the use of the Police Department, for a term of three years from the date of occupation, with the privilege of a renewal for a further period of three years, at an annual rental of twenty-one hundred dollars ($2,100), payable quarterly; the City to make all alterations and repairs, to pay the water rent, furnish light, heat and janitor service; the owner to pay the taxes—and the Commissioners of the Sinking Fund deeming the said rent fair and reasonable and that it would be for the interests of the City that such lease be made, the Comptroller be and is hereby authorized and directed to execute the same when prepared and approved by the Corporation Counsel, as provided by sections 149 and 217 of the Greater New York Charter.

The report was accepted and the resolution unanimously adopted.

The following communication was received from the Department of Street Cleaning relative to a renewal of the lease of premises at No. 166 South Fourth street, in the Borough of Brooklyn:

NEW YORK, October 10, 1904.

Hon. GEORGE B. MCCLELLAN, *Mayor, Chairman, Board of Commissioners of the Sinking Fund:*

SIR—I request the consent and approval of your Board pursuant to section 541 of the Charter, for a renewal of the lease from Terrence Nugent (residing at No. 163 South Fourth street, Brooklyn), of the store or ground floor, cellar and stable of the premises No. 166 South Fourth street, in the Borough of Brooklyn, for a term of two years, beginning January 1, 1905; otherwise upon the same terms and conditions as the existing lease.

In the former lease Mr. Nugent executed as agent of E. E. Blumenthal, but in the proposed renewal of the lease he will act as principal, being a lessee of the premises, with authority to sublease.

Respectfully,
JOHN McGAW WOODBURY, Commissioner.

Approved for renewal upon the same terms and conditions as are contained in the existing lease. Lessor, Terrence Nugent.

MORTIMER J. BROWN,
Appraiser of Real Estate in charge of Bureau.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Commissioners of the Sinking Fund hereby approve of and consent to the execution by the Commissioner of Street Cleaning, of a renewal of the lease to the City, of the store or ground floor, cellar and stable, of premises No. 166 South Fourth street, Borough of Brooklyn, for a term of two years from January 1, 1905, at an annual rental of three hundred dollars ($300), payable quarterly, and on the same terms and conditions as contained in the existing lease; Terrence Nugent, lessor—the Commissioners of the Sinking Fund deeming the said rent fair and reasonable, and that it would be for the interests of the City that such lease be made.

Which was unanimously adopted.

The Comptroller presented the following report and offered the following resolutions, relative to a renewal of the lease of rooms in the Temple Bar Building, Nos. 38-44 Court street, Borough of Brooklyn, for the use of the Commissioner of Records of the County of Kings:

OCTOBER 15, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—The Commissioners of the Sinking Fund at a meeting held March 16, 1904, authorized a lease for the Commissioner of Records of the County of Kings, of rooms in the Temple Bar Building. Nos. 38-44 Court street, Borough of Brooklyn, for a term of six months from February 16, 1904, with the privilege of a further renewal of six months. The lessor refuses to execute the lease with the renewal clause for the reason that he desires the lease to expire at a regular rental period.

Hon. John K. Neal, Commissioner of Records of the County of Kings, in a communication under date of September 21, 1904, states "It will not be necessary * * * to extend the lease beyond February 1, 1905."

I would respectfully recommend that the Commissioners of the Sinking Fund rescind the resolution of March 16, 1904, in relation to these premises, and authorize a renewal of the lease of rooms in the Temple Bar Building, Nos. 38-44 Court street, Borough of Brooklyn, for the use of the Commissioner of Records, Kings County, from February 16, 1904, to February 1, 1905, at the annual rental of $8,411.25, payable quarterly, otherwise on the same terms and conditions as contained in the existing lease. Lessor, David G. Leggett.

Respectfully submitted for approval,

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

Approved:
EDWARD M. GROUT, Comptroller.

Resolved, That the resolution adopted by this Board at meeting held March 16, 1904, authorizing a renewal of the lease of rooms in the Temple Bar Building, Nos. 38 to 44 Court street, Borough of Brooklyn, for the use of the Commissioner of Records, Kings County, as temporary quarters during repairs, alterations and additions to the Hall of Records, be and the same is hereby rescinded.

Resolved, That the Comptroller be and is hereby authorized and directed to execute a renewal of the lease to the City, from David G. Leggett, of Rooms Nos. 500, 501, 502, 503, 504 and 510 on the fifth floor, and Rooms Nos. 600, 601, 606, 607, 611, 615, 616, 617 and 618 on the sixth floor, in the Temple Bar Building, Nos. 38-44 Court street, Borough of Brooklyn, for the use of the Commissioner of Records, Kings County, as temporary quarters during repairs, alterations and additions to the Hall of Records, for a term from February 16, 1904, to February 1, 1905, at an annual rental of eight thousand four hundred and eleven dollars and twenty-five cents ($8,411.25), payable quarterly, otherwise upon the same terms and conditions as contained in the existing lease; —the Commissioners of the Sinking Fund deeming the said rent fair and reasonable and that it would be for the interests of the City that such lease be made.

The report was accepted and the resolutions severally unanimously adopted.

The Comptroller presented the following report of the Engineer of the Department of Finance relative to the action of the Armory Board in appropriating the sum of $55,000 for the installation of a plant for supplying electricity in the Seventh Regiment Armory Building:

OCTOBER 13, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—At a meeting of the Armory Board held September 29, 1904, the following was adopted:

"Resolved, That the report of the Committee on Armories for Manhattan and The "Bronx, of date September 29, 1904, on heating and lighting the Seventh Regiment "Armory Building by an independent heating and lighting plant, be accepted and "adopted; that the sum of fifty-five thousand dollars ($55,000) be and is hereby appro- "priated for the installation of a plant for supplying electricity in said armory building, "including architects' fees, on the general plans prepared by Messrs. Clinton & Russell, "architects, and that the Commissioners of the Sinking Fund be requested to concur "in the same and authorize the Comptroller to issue bonds to provide for the expense "thereof."

I have had the matter looked into with care, including visits to plants in operation, to the armory in question, and conferences with officials of the Edison system, which is now supplying electric current to the armory.

I present the result of these investigations in tabular form below:

Proposed Heating and Lighting Plant.

Estimated cost of new plant, including architects' fees, $55,000; allowance for interest, depreciation, etc., on this cost at 10 per cent., gives a yearly charge of		$5,500 00
Estimated coal consumption, 1,530 tons, at $3.50		5,355 00
Estimated engine room force:		
Engineers, 3 at $1,460 per year	$4,380 00	
Firemen, 3 at $730 per year	2,190 00	
Coal Passers, 2 at $730 per year	1,460 00	
		8,030 00
Oil, packing waste, etc		500 00
Total yearly cost		$19,385 00
Present cost:		
Lighting.		
Edison service, average of 2 years		$8,586 20
Heating.		
Coal, 250 tons at $5.45		1,362 50
Engine room force, 2 Engineers at $1,460	$2,920 00	
Engine room force, 2 Firemen at $730	1,460 00	
		4,380 00
10 per cent. on $15,000, estimated cost of new boilers for heating		1,500 00
Total present cost		$15,828 70
RECAPITULATION.		
Cost of new plant per year		$19,385 00
Cost of present arrangement		15,828 70
Balance in favor of present system		$3,556 30

It will be noticed that I include in present cost, $1,500, or 10 per cent. of the estimated cost of new boilers for heating. The boilers now in use have been 26 years in service, and must soon be replaced. I have therefore thought best to include the item here, though it is not now a charge upon the City.

I believe that I have underestimated rather than overestimated the annual cost of the proposed plant, and I therefore have no hesitation in recommending the disapproval of the proposed resolution, as its adoption would mean a loss to the City of at least $3,550 per year without corresponding advantages.

Respectfully,
EUG. E. McLEAN, Engineer.

Approved:
E. M. GROUT.

After consideration the matter was referred back to the Armory Board with a copy of the report:

The Comptroller presented the following report of the Engineer of the Department of Finance, and offered the following resolution relative to the action of the Armory Board in accepting the bids of Thomas J. Buckley, for alterations and repairs to Squadron "A" Armory, in the Borough of Manhattan, and for alterations and repairs to the armories of the Eighth, Twelfth and Twenty-second Regiments and Squadron "A" in Manhattan, and the Fourteenth and Twenty-third Regiments in Brooklyn, and the Seventeenth Separate Company in Queens:

OCTOBER 4, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—At a meeting of the Armory Board held September 29, 1904, the following was adopted:

"Resolved, That the bid of Thomas J. Buckley, No. 408 Tenth avenue, in the "Borough of Manhattan, for alterations and repairs to Squadron "A" Armory, in the "Borough of Manhattan, Item number one, amounting to the sum of three thousand "six hundred dollars ($3,600), be accepted as being the lowest bid for said work; "that the same be submitted to the Commissioners of the Sinking Fund for their con- "currence, and to the Comptroller for his approval of the sureties thereon, and when "so approved the Chairman of this Board be authorized to execute the contract on "behalf of the Board; that all the other bids be rejected, and the deposits received "at this meeting be forwarded to the Comptroller with the request that he return the "amounts received from the unsuccessful bidders."

"Resolved, That the bid of Thomas J. Buckley, No. 408 Tenth avenue, in the "Borough of Manhattan, for alterations and repairs to the Eighth, Twelfth, Twenty- "second Regiments and Squadron 'A' in Manhattan; Fourteenth and Twenty-third "Regiments in Brooklyn, and the Seventeenth Separate Company in Queens, amounting "to the sum of ten thousand and five hundred dollars ($10,500), be accepted as being "the lowest bid for said work; that the same be submitted to the Commissioners of the "Sinking Fund for their concurrence, and to the Comptroller for his approval of the "sureties thereon, and when so approved the Chairman of this Board be authorized to "execute the contract on behalf of the Board; that all the other bids be rejected, and "the deposits received at this meeting be forwarded to the Comptroller with the re- "quest that he return the amounts received from the unsuccessful bidders."

I would report that the work designated in item one is to be charged to the Armory Board's appropriation for "Repairs and Supplies." Item No. 2 is a special appropriation of $12,000 appropriated by the Armory Board on February 15, 1904, and concurred in by the Commissioners of the Sinking Fund on February 2, 1904.

On September 29, 1904, the Armory Board received the following bids:

Item No. 1.

Squadron "A" Armory, Manhattan.

Charles Wille, No. 39 East Thirty-eighth street	$4,500 00
Ralph J. F. Gerstle, No. 341 East Forty-fourth street	4,564 00
Neptune B. Smyth, No. 1123 Broadway	4,200 00
Thomas J. Buckley, No. 408 Tenth avenue	3,600 00

Item No. 2.

Eighth, Twelfth, Twenty-second Regiments and Squadron "A", Manhattan; Fourteenth and Twenty-third Regiments in Brooklyn, and Seventeenth Separate Company in Queens.

Charles Wille, No. 39 East Thirty-eighth street	$12,784 00
Ralph J. F. Gerstle, No. 341 East Forty-fourth street	11,861 00
Neptune B. Smyth, No. 1123 Broadway	13,500 00
William Horne Company, No. 245 West Twenty-sixth street	15,000 00
Thomas J. Buckley, No. 408 Tenth avenue	10,500 00
James F. Disken, No. 114 East Twenty-third street	11,997 00

The bids of Thomas J. Buckley for Item No. 1, $3,600, and for Item No. 2, $10,500, being the lowest, I think the Commissioners of the Sinking Fund may properly concur in the action of the Armory Board.

Respectfully,
EUG. E. McLEAN, Engineer.

Resolved, That the Commissioners of the Sinking Fund hereby concur in the action of the Armory Board by resolution adopted September 29, 1904, accepting the bid of Thomas J. Buckley for alterations and repairs to Squadron "A" Armory, in the Borough of Manhattan, amounting to the sum of three thousand six hundred dollars ($3,600), and also concur in the resolution adopted on the same day, accepting the bid of Thomas J. Buckley for alterations and repairs to the Eighth, Twelfth and Twenty-second Regiments and Squadron "A" in Manhattan; Fourteenth and Twenty-third Regiments in Brooklyn, and the Seventeenth Separate Company in Queens, amounting to the sum of ten thousand five hundred dollars ($10,500).

The report was accepted and the resolution unanimously adopted.

The Comptroller presented the following report relative to the sale of property No. 28 Beaver street, in the Borough of Manhattan:

OCTOBER 3, 1904.

To the Commissioners of the Sinking Fund:

GENTLEMEN—Pursuant to a resolution adopted by the Commissioners of the Sinking Fund at meeting held May 23, 1904, a sale was had at 12 o'clock noon, on Monday, June 20, 1904, at the New York Real Estate salesroom, No. 161 Broadway, of the following described real estate belonging to the corporation of The City of New York, viz.:

"All that certain lot, piece or parcel of land, situate, lying and being in the Borough of Manhattan, City of New York, known as No. 28 Beaver street, premises being known as Lot No. 14, in Block 11, on the tax maps of the Borough of Manhattan, City of New York."

The property was sold to the Chelsea Realty Company for the sum of fifty-six thousand dollars ($56,000), and the proceeds deposited in the Sinking Fund for the Redemption of the City Debt.

Respectfully,
EDWARD M. GROUT, Comptroller.

Filed.

The Comptroller presented the following report relative to the sale of property near the corner of Plymouth and Adams streets, in the Borough of Brooklyn:

OCTOBER 13, 1904.

To the Commissioners of the Sinking Fund:

GENTLEMEN—Pursuant to a resolution adopted by the Commissioners of the Sinking Fund at meeting held September 16, 1904, a sale was had at 12 o'clock noon, Tuesday, October 11, at the Real Estate Exchange salesroom, No. 189 Montague street, Borough of Brooklyn, of the following described real estate belonging to the Corporation of The City of New York, viz.:

All that piece or parcel of land situate and being in the Borough of Brooklyn, County of Kings and State of New York, bounded and described as follows:

"Beginning at a point on the southerly side of Plymouth street, distant 115 feet westerly from the southwesterly corner of Plymouth and Adams streets, and running thence southerly and parallel with Adams street 100 feet easterly parallel with Plymouth street, 45.18 feet; thence northerly parallel with Adams street 16.06 feet; thence northwesterly 92.32 feet to a point in the southerly line of Plymouth street, distant 109.61 feet westerly from the southwesterly corner of Plymouth and Adams streets; thence running westerly 5.39 feet to the point or place of beginning."

The property was sold to Robert Gair for the sum of $6,500, the upset price, and the proceeds deposited in the Sinking Fund for the Redemption of the City Debt.

Respectfully,
EDWARD M. GROUT, Comptroller.

Filed.

The Comptroller presented the following report and offered the following resolution relative to a transfer of $1,493.76 from the Sinking Fund of the City of Brooklyn to the credit of the account, "Borough of Brooklyn Assessors' Arrearages, Laws of 1883," the aforesaid amount having been erroneously deposited in said Sinking Fund:

OCTOBER 13, 1904.

To the Commissioners of the Sinking Fund:

GENTLEMEN—On June 30, 1899, there was deposited by the Collector of City Revenue, etc., to the credit of the "Sinking Fund of the City of Brooklyn" the sum of $1,493.76 as "Sales of Real Estate." This deposit was erroneously made in the Sinking Fund of the City of Brooklyn and should have been in the City Treasury to the credit of the account entitled, "Borough of Brooklyn Assessors' Arrearages, Laws of 1883," for the following reasons:

On December 8, 1897, the former City of Brooklyn sold at public auction property known as Lots Nos 26 and 27, Block 32, in the Fifteenth Ward, previously acquired by the City of Brooklyn at a sale for unpaid taxes, etc. The amount for which said property was sold was $1,875, upon which the purchaser, Matthew Meagher, paid on day of sale (December 8, 1897) ten per centum thereof, to wit, $187.50. This latter sum was deposited in the Treasury of the City of Brooklyn to the credit of the aforesaid "Assessors' Arrearages Fund," leaving a balance of $1,687.50 to be paid by said purchaser. From said balance of $1,687.50 there was allowed the purchaser, under an opinion of the Corporation Counsel, the following items:

Amount of mortgage	$125 00
Taxes for 1897	51 49
Water taxes of 1897	17 25
Making a total of	$193 74

—leaving the above balance of $1,493.76, which was paid by the said purchaser and deposited as aforesaid.

Under these circumstances I recommend that said amount of $1,493.76 be transferred to the City Treasury, and I submit a resolution authorizing the drawing of a warrant for that purpose.

Respectfully,
EDWARD M. GROUT, Comptroller.

Resolved, That a warrant for the sum of one thousand four hundred and ninety-three and seventy-six one-hundredths dollars ($1,493.76) be drawn in favor of the Chamberlain, payable from the "Sinking Fund of the City of Brooklyn," transferring to the City Treasury, to be placed to the credit of the account, "Borough of Brooklyn, Assessors' Arrearages, Laws of 1883," the aforesaid amount erroneously deposited in said Sinking Fund under date of June 30, 1899, as Sales of Real Estate.

The report was accepted and the resolution unanimously adopted.

The Comptroller offered the following resolution to authorize the cancellation at maturity of certain stock amounting to $2,895,000 held by the Commissioners of the Sinking Fund:

Whereas, The following described stock issued by The City of New York, as constituted prior to January 1, 1898, which is payable from the Sinking Fund for the Redemption of the City Debt, No. 2, under the provisions of section 10 of article 8 of the Constitution of the State of New York, and all of which is held by said Sinking Fund, mature on November 1, 1904, viz.:

Two and one-half per cent. Additional Croton Water Stock of The City of New York, issued in pursuance of chapters 56 and 328 of the Laws of 1871, and section 141 of the City Consolidation Act of 1882, payable November 1, 1904	$300,000 00
Three per cent. Additional Croton Water Stock of The City of New York, issued in pursuance of chapters 56 and 328 of the Laws of 1871, and section 141 of the City Consolidation Act of 1882, payable November 1, 1904	2,595,000 00
Total	$2,895,000 00

Resolved, That the Comptroller be and is hereby authorized to cancel at maturity the hereinbefore described Stock amounting to two million, eight hundred and ninety-five thousand dollars ($2,895,000) which is held by the Commissioners of the Sinking Fund for the account of the Sinking Fund for the Redemption of the City Debt, No. 2.

Which resolution was unanimously adopted.

The Comptroller offered the following resolution to authorize the redemption of bonds to the amount of $40,000, and the cancellation of bonds amounting to $504,000 held by the Commissioners of the Sinking Fund:

Whereas, The following described bonds issued by The City of New York, as constituted prior to January 1, 1898, are payable from the Sinking Fund for the Redemption of the City Debt, No. 1, and by the terms of their issue may be redeemed at any time after November 1, 1904, viz.:

Title.	Amount Redeemable.	Amount Held by the Sinking Fund for the Redemption of the City Debt, No. 1.	Amount Held by the Sinking Fund for the Redemption of the City Debt, No. 2.
Three per cent. Criminal Court-house Bonds of The City of New York, issued in pursuance of section 8 of chapter 371 of the Laws of 1887, Redeemable after November 1, 1904, and Payable November 1, 1908	$544,000 00	$504,000 00	$40,000 00

Resolved, That said bonds be redeemed on November 2, 1904, and that the Comptroller be and is hereby authorized to draw a warrant for forty thousand dollars ($40,000) upon the Sinking Fund for the Redemption of the City Debt, No. 1, in favor of the Sinking Fund for the Redemption of the City Debt, No. 2, for the payment on November 2, 1904, of the amount of said bonds held by said Sinking Fund, No. 2, and to cancel on said date the said bonds held by the Sinking Fund for the Redemption of the City Debt, No. 1, amounting to five hundred and four thousand dollars ($504,000).

Which resolution was unanimously adopted.

The Comptroller offered the following resolution to authorize the redemption of bonds held by the public, amounting to $348,800, and the cancellation of bonds held by the Commissioners of the Sinking Fund, amounting to $976,000.

Whereas, The following-described stock issued by The City of New York, as constituted prior to January 1, 1898, matures on November 1, 1904, and is payable from the Sinking Fund for the Redemption of the City Debt, No. 1, viz.:

Title.	Amount Maturing.	Amount Held by the Sinking Fund for the Redemption of the City Debt, No. 1.	Amount Held by the Public.
Six per cent. Dock Bonds of The City of New York, issued in pursuance of chapter 574 of the Laws of 1871	$976,000 00	$976,000 00	.....
Seven per cent. Dock Bonds of The City of New York, issued in pursuance of chapter 574 of the Laws of 1871	348,800 00	.....	$348,800 00
Totals	$1,324,800 00	$976,000 00	$348,800 00

Resolved, That the Comptroller be and hereby is authorized to pay from the Sinking Fund for the Redemption of the City Debt, No. 1, upon the maturity of said stock the sum of three hundred and forty-eight thousand eight hundred dollars ($348,800) for the redemption of that portion of said stock that is held by the public, and to cancel that portion of said stock amounting to nine hundred and seventy-six thousand dollars ($976,000) that is held by the Commissioners of the Sinking Fund for the account of the Sinking Fund for the Redemption of the City Debt, No. 1.

Which resolution was unanimously adopted.

The Comptroller presented the following statement and offered the following resolution, relative to fines payable to the New York Society for the Prevention of Cruelty to Children, American Society for the Prevention of Cruelty to Animals, Dental Society of the State of New York:

OCTOBER 17, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—The following fines imposed by the Court of Special Sessions, First and Second Division, have been collected at dates stated in September, 1904, and are payable pursuant to law to the several societies named:

To New York Society for the Prevention of Cruelty to Children (section 5, chapter 122, Laws of 1876)—

Court of Special Sessions, First Division:

Sept. 6.	William Capelle	$10 00
Sept. 8.	Henry R. Roe	15 00
Sept. 22.	Michael Slavin	100 00
Sept. 22.	Rita Carlyle	25 00
Sept. 29.	Patrick Hardman	50 00
Sept. 29.	Julius Eichman	25 00
Sept. 18.	William Oberndorf (paid Warden, City Prison)	250 00
	Total	$475 00

To American Society for the Prevention of Cruelty to Animals (section 6, chapter 420, Laws of 1886)—

Court of Special Sessions, First Division:

Sept. 14.	Andrew Chibos	$25 00

Court of Special Sessions, Second Division:

Sept. 16.	Samuel P. Kirschnel (Brooklyn)	$25 00	
Sept. 16.	William Payne (Brooklyn)	20 00	
Sept. 16.	Frank Wissell (Brooklyn)	25 00	
Sept. 16.	Israel Hirsch (Brooklyn)	100 00	
Sept. 16.	Denis McCrossin (Brooklyn)	25 00	
Sept. 23.	John Hildstaff (Brooklyn)	10 00	
Sept. 30.	Abraham Lesney (Brooklyn)	10 00	
Sept. 30.	Frederick De Vean (Brooklyn)	10 00	
Sept. 8.	Henry C. Dross (Richmond)	50 00	
Sept. 15.	Michael Blumberg (Richmond)	20 00	
			$295 00
	Total		$320 00

To Dental Society of the State of New York (section 169, chapter 215, Laws of 1902)—

Court of Special Sessions, Second Division:

Sept. 9.	James E. Van Nattan (Brooklyn)	$50 00

All the above cases were prosecuted by the officers of the several societies to which fines are payable. The amount collected has been deposited to the credit of the Sinking Fund for the Payment of the Interest on the City Debt.

Respectfully,
I. S. BARRETT, Bookkeeper.

Resolved, That warrants payable from the Sinking Fund for the Payment of the Interest on the City Debt, be drawn in favor of the following societies, etc., being the amount of fines imposed and collected by the Court of Special Sessions, First and Second Divisions, in the month of September, 1904, and payable to said societies, pursuant to law, viz.:

New York Society for the Prevention of Cruelty to Children	$475 00
American Society for the Prevention of Cruelty to Animals	320 00
Dental Society of the State of New York	50 00

Which resolution was unanimously adopted.

The Comptroller presented the following statement and offered the following resolution relative to the refunding of amounts overpaid for street vault permits:

OCTOBER 17, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—The following applications for the refund of amounts overpaid for street vault permits are respectfully submitted, viz.:

Applicant.	Location.	Overpaid.
Jesse W. Ehrich	Nos. 62 and 64 West One Hundred and Sixteenth street	$112 00
C. F. Lohse	East side Union avenue, 78 feet south One Hundred and Fifty-second street, The Bronx	8 10
Total		$120 10

The first of the above applicants did not build the vault, but surrendered his permit, which has been canceled. With the second application is a certificate of the City Surveyor, certified by the Chief Engineer and Superintendent of Highways and approved by the President of the Borough of The Bronx.

The total amount paid was deposited to the credit of the Sinking Fund for the Redemption of the City Debt, No. 1.

Respectfully,
I. S. BARRETT, Bookkeeper.

Resolved, That warrants payable from the Sinking Fund for the Redemption of the City Debt, No. 1, be drawn in favor of the following persons, refunding them the amount overpaid by them severally for permits to build street vaults in front of premises as per statement submitted, viz.:

Jesse W. Ehrich	$112 00
C. F. Lohse	8 10

Which resolution was unanimously adopted.

The Comptroller presented the following statement and offered the following resolution relative to the refunding of Croton water rents paid in error:

OCTOBER 20, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—Applications have been made as per statement herewith for the refund of Croton water rents paid in error.

The applications are severally approved by the Commissioner of Water Supply, Gas and Electricity or the Collector of Assessments and Arrears, and the amount so paid ($1,655.78) has been deposited to the credit of the Sinking Fund for the Payment of the Interest on the City Debt.

Respectfully,
I. S. BARRETT, Bookkeeper.

Water Register.

Joseph Lurch	$6 50
Maria F. Emerson	16 00
George Place, agent	72 00
Christian Zabriskie, agent	30 00
Wilber C. Goodale, agent	18 00
John W. Haaren	23 00
Charles L. Carpenter, agent	72 00
Wallace D. Barkley, agent	9 00
Charles F. Porter, agent	8 00
Edwin H. Rogers, agent	101 20
Maria W. Barton	9 00
William L. Mitchell	11 00
William D. Phillips	30 00
Kaufman Simon, agent	17 00
George W. Sturges, executor	10 00
Thomas William Gerrard, agent	11 00
Charles Berbarini, attorney	10 00
William F. Bohnenkamp, agent	68 00
William R. Ware, agent	71 00
Maria Aspen	10 00
Stuyvesant Wainwright	15 00
Stuyvesant Wainwright	13 00
Abraham A. Greenhoot, lessee	9 00
Anita H. H. Morrell, agent	239 00
Jacob F. Liebler, agent	42 00
Thomas Watson, agent	47 00
Ira B. Stewart, treasurer	38 00
William J. Bowe	23 00
Samuel A. Simpson, agent	10 00
Frederick Pflomm, agent	11 00
I. & L. Chauser	38 35
Mrs. L. Green, lessee	10 00
William A. Shelton, agent	34 00
Julia Raudnitz	8 40
George R. Read & Co., agents	18 00
Catharine Demarest	6 00
John Edwards	52 00
Joseph A. Flannery, attorney for Alexander G. Bolton	19 80
Wenzel C. Urban	9 45
George N. Kanenbley	140 00
Charles Haardt	39 90
Mrs. Catharine L. Winslow	1 05
J. F. Chambers, attorney, Title Guarantee and Trust Company	22 05
Ruth Ann Wallace	31 50
Margaret Hyland	60 00
Michael Power, agent	11 55
Albro Akin	20 00
Samuel D. Folsom, agent	17 00
Title Guarantee and Trust Company	19 00
Title Guarantee and Trust Company	18 90
Meyer Goldberg	24 00
Florence Sullivan	3 00
	$1,653 65

Collector of Assessments and Arrears.

Fredericka Keller	2 13
	$1,655 78

Resolved, That a warrant payable from the Sinking Fund for the Payment of the Interest on the City Debt be drawn in favor of the Chamberlain for the sum of sixteen hundred and fifty-five and seventy-eight one-hundredths dollars ($1,655.78) for deposit in the City Treasury to the credit of "Croton Water Rent Refunding Account," for refunding erroneous and over payments of Croton water rents, as per statement submitted herewith.

Which resolution was unanimously adopted.

The Comptroller presented the following statement and offered the following resolution, relative to the refunding of court fees paid in error:

OCTOBER 17, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—From proofs herewith submitted, it appears that on July 6, 1904, Alexander Finelite, as attorney for defendant in the matter of Julius Gumpel et al. vs. Chapmans, paid to the Clerk of the Tenth District Municipal Court (Manhattan) four dollars return fees on appeal. That, as per certificate of Clerk of said Tenth District Court, no return was ever filed with the Appellate Term, and that the said Alexander Finelite is entitled to the return of amount of fee so deposited.

On the 25th day of August, 1904, a clerk from the office of Kenneson, Emley & Rubino, attorneys for the plaintiff, by mistake entered in the Supreme Court, New York County, the matter of McLaughlin against Leonard, and paid the regular calendar fee, $4 ($1 being fee paid the Sheriff on each case entered and $3 Stenographer's fee paid to City). It appears that a stipulation had already been signed changing the venue of the action from New York County to Kings County; and later, September 29, a note of issue was filed with the Clerk of the Supreme Court of the County of Kings and the regular fee, 75 cents, paid therefor.

An order of the Supreme Court (Part II.), County of New York, entered September 27, 1904, directs the return of the calendar fee paid by mistake as above stated.

The fees paid have been deposited to credit of the Sinking Fund for the Payment of the Interest on the City Debt.

Respectfully,
I. S. BARRETT, Bookkeeper.

Resolved, That warrants payable from the Sinking Fund for the Payment of the Interest on the City Debt be drawn in favor of the following parties, refunding them the amount of court fees paid in error, viz.:

Alexander Finelite	$4 00
Kenneson, Emley & Rubino	3 00

Which resolution was unanimously adopted.

The Comptroller presented the following statement and offered the following resolution, relative to the refunding of assessment for Prospect Park Improvement paid in error:

OCTOBER 17, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—On August 12, 1904, Dennis J. Donovan overpaid the following assessment installment for Prospect Park Improvement, viz.:

Installment.	Ward.	Block.	Lot.	Amount.	Interest.	Total.
1900	9	76	96	$4 67	$1 53	$6 20
1901	9	76	96	4 67	1 11	5 78
1902	9	76	96	6 58	1 00	7 58
				$15 92	$3 64	$19 56

The amount so overpaid was deposited in the Sinking Fund of the City of Brooklyn; the refund will be made through the account "Refunding Assessments Paid in Error, Borough of Brooklyn."

The resolution herewith is necessary to reimburse this account for amount of assessment and interest so to be refunded.

Respectfully,
I. S. BARRETT, Bookkeeper.

Resolved, That a warrant payable from the Sinking Fund, City of Brooklyn, be drawn in favor of the Chamberlain for the sum of nineteen and fifty-sixth one-hundredths dollars ($19.56), to be deposited in the City Treasury to the credit of "Refunding Assessments Paid in Error, Borough of Brooklyn," to refund Dennis J. Donovan through this account, this amount of assessment and interest for Prospect Park improvement, overpaid in error.

Which resolution was unanimously adopted.

The Comptroller presented the following statement and offered the following resolution, relative to a transfer of $79.53 from Sinking Fund No. 1 to the City Treasury:

OCTOBER 17, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—On August 10, 1904, the estate of I. & S. Bernheimer overpaid in error ($79.53) seventy-nine and fifty-three one-hundredths dollars for Bloomingdale road closing, confirmed December 4, 1880, on Lots Nos. 39 to 47, Block 920, in the Twelfth Ward.

The amount of this overpayment was deposited in the City Treasury to the credit of the Sinking Fund for the Redemption of the City Debt No. 1, and the estate of I. & S. Bernheimer has been paid the amount so overpaid by it from the account "Refunding Assessments Paid in Error, Borough of Manhattan."

Request is hereby made to reimburse the latter account with the amount of assessment as above, $79.53, paid into the Sinking Fund for the Redemption of the City Debt No. 1.

Respectfully,
I. S. BARRETT, Bookkeeper.

Resolved, That a warrant payable from the Sinking Fund for the Redemption of the City Debt No. 1 be drawn in favor of the Chamberlain for the sum of seventy-nine and fifty-three one-hundredths dollars ($79.53), for deposit in the City Treasury to credit of account "Refunding Assessments Paid in Error—Borough of Manhattan," to reimburse said account for the amount of assessment paid in error into the said Sinking Fund, and refunded from said "Refunding Account," as per statement submitted herewith.

Which resolution was unanimously adopted.

The Comptroller presented the following report and offered the following resolution relative to a sale at public auction of all the right, title and interest of The City of New York, which it has by virtue of a lease from the Supervisor of the Town of Gravesend to the city of Brooklyn, which lease is dated December 24, 1896, and recorded December 29, 1896, in liber 3, page 249, section 21, in the Kings County Register's Office:

(Application of Mrs. Rachael Kendall.)

OCTOBER 5, 1904.

Hon. EDWARD M. GROUT, *Comptroller:*

SIR—Mrs. Rachael Kendall is the owner of a piece of property located on the westerly line of Cortlandt street, near Neptune avenue, in the Borough of Brooklyn, County of Kings, City of New York, and has contracted to dispose of the same to one Katie Brandt. The Title Guarantee and Trust Company, who examined the title for Mrs. Brandt, discovered there were three sales made by the old Town of Gravesend on August 9, 1894, as follows:

No. of Parcel.	Assessment.	When Sold.	Amount.	Deed Delivered.	To
24	Opening Cortlandt avenue.	Aug. 9, 1894	$20 17	Dec. 24, 1896	City of Brooklyn
5	Opening Neptune avenue..	Aug. 9, 1894	6 31	Dec. 24, 1896	City of Brooklyn
5	Grading Neptune avenue..	Aug. 9, 1894	50 43	Dec. 24, 1896	City of Brooklyn

Mrs. Kendall now makes application to the Commissioners of the Sinking Fund for a quit-claim deed of the City's interests in said property arising from the sale made on the 9th day of August, 1894, by the Town of Gravesend, for the non-payment of an assessment for the opening of Cortlandt avenue and the opening and grading of Neptune avenue, amounting to $76.91, which sale was for the term of 100 years, and by reason of which sale, on December 24, 1896, the lot was conveyed to the city of Brooklyn by William C. V. Bennett, Supervisor of the Thirty-first Ward, by deed dated on said date, and recorded December 29, 1896, in section 21, liber 3, page 249 of conveyances.

The property under consideration became the property of the City of Brooklyn on the annexation of the Town of Gravesend to the City. The Board of Supervisors of the County of Kings was abolished by chapter 954 of the Laws of 1895. The body having authority in the City of Brooklyn to dispose of this class of City property was the Common Council, that being the legislative body of the City, and no such power being vested in any other of the officers or departments thereof.

By section 205 of the Charter of the Greater City, the power to sell the real estate of The City of New York is vested in the Board of Commissioners of the Sinking Fund. This section provides that the Board must sell City property at public auction for the highest marketable price, after due advertisement and appraisal, under and by direction of said Board.

The Corporation Counsel in similar proceedings has heretofore advised in the sale of properties of this character, and in accordance with this advice it becomes necessary in this instance for the Commissioners of the Sinking Fund to appraise the City's interest in and to this lease for 100 years. This might be determined by commuting an annual rental, based upon the value of the property. It is my opinion, however, that should the City receive the sums paid out by the former Town of Gravesend, with interest on the same to date, together with a sum sufficient to pay for the expenses which have been incurred on account of this unpaid assessment, such as the advertisement of sale, expenses of sale, drawing and recording of the deed, and the further expense now incurred by the sale of this property, that the interest of The City of New York will be fully protected without hardship upon the property-owner. This course has been pursued and adopted in all previous cases that have been acted upon by the Commissioners of the Sinking Fund. (See Min. S. F. 1900, pages 332, 335, 393, 406.)

It seems a hardship to Mrs. Kendall in this case to be compelled to pay the additional fee of $100 beyond those which are chargeable for the amount of sale and the interest thereon, computed at the rate of 6 per cent. per annum to the date of sale. Mrs. Kendall has submitted to this office receipts of the property showing that she has paid taxes, assessments and water rates up to the present time, and was unable, by any memorandum on the tax bills, to discover that the property had been sold for the non-payment of assessments. The failure on the part of the public officials to comply with the law in this respect gives this owner a certain equity which the City should recognize.

I would therefore recommend that the Commissioners of the Sinking Fund authorize a sale at auction of all the right, title and interest of The City of New York in and to the property described below, which it has by virtue of a lease from William V. B. Bennett, Supervisor of the Town of Gravesend, to the City of Brooklyn, which lease is dated December 24, 1896, and recorded December 29, 1896, in liber 3, page 249, section 21, in the Kings County Register's office.

All that certain lot known as and by Parcel 5 upon the asssessment roll for the grading of Neptune avenue, in the late Town of Gravesend, now Thirty-first Ward, Borough of Brooklyn, City of New York, which was sold to the Town of Gravesend at a sale for unpaid assessments, held on the 9th day of August, 1894, for the sum of $50.43, which said lot was thereafter leased to the City of Brooklyn for 100 years.

All that certain lot known as and by Parcel 5 upon the assessment roll for the opening of Neptune avenue, in the late Town of Gravesend, now Thirty-first Ward, Borough of Brooklyn, City of New York, which was sold to the Town of Gravesend at a sale for unpaid assessments, held on the 9th day of August, 1894, for the sum of $6.31, which said lot was thereafter leased to the City of Brooklyn for 100 years.

All that certain lot known as and by parcel 24, upon the assessment roll for the opening of Cortlandt street, in the late Town of Gravesend, now Thirty-first Ward, Borough of Brooklyn, City of New York, which was sold to the Town of Gravesend at a sale for unpaid assessments, held on the 9th day of August, 1894, for the sum of $20.17, which said lot was thereafter leased to the City of Brooklyn for one hundred years,

—and that the interests of The City of New York in and to the same be appraised at the sum of $124.20, of which amount $47.29 is the interest on the three amounts above named at the rate of 6 per cent. per annum, from the 9th day of August, 1894, to the date of said sale, and that the costs and expenses of examination and advertising, etc., in this case, be waived on the part of the City for the reason above stated.

Respectfully submitted for approval,

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

Approved:
EDWARD M. GROUT, Comptroller.

Resolved, That, pursuant to the provisions of section 205 of the Amended Greater New York Charter, the Comptroller be and is hereby authorized and directed to sell at public auction, after due advertisement, for cash, to the highest bidder, all the right, title and interest of The City of New York, which it has by virtue of a lease from William V. B. Bennett, Supervisor of the Town of Gravesend, to the City of Brooklyn, which lease is dated December 24, 1896, and recorded December 29, 1896, in Liber 3, page 249, Section 21, in the Kings County Register's office, in and to "All that certain lot known as and by parcel 24, upon the assessment roll for the opening of Cortlandt street, in the late Town of Gravesend, now Thirty-first Ward, Borough of Brooklyn, City of New York, which was sold to the Town of Gravesend at a sale for unpaid assessments, held on the 9th day of August, 1894, for the sum of $20.17, which said lot was thereafter leased to the City of Brooklyn for one hundred years."

Resolved, That the minimum or upset price for said land be and is hereby appraised and fixed at $124.20.

The report was accepted and the resolution unanimously adopted.

The following communication was received from the Department of Water Supply, Gas and Electricity, relative to a renewal of the leases of premises No. 437 West Thirty-seventh street, Manhattan; corner Washington avenue and One Hundred and Sixty-sixth street, The Bronx, and corner Webster avenue and Two Hundred and First street, Borough of The Bronx:

OCTOBER 17, 1904.

Hon. N. TAYLOR PHILLIPS, *Secretary, Sinking Fund Commission, New York City:*

DEAR SIR—I respectfully recommend that the City renew, for a term of three years, its present leases of the following described property, now used for repair shops by this Department:

Repair Company 2, No. 437 West Thirty-seventh street, $780; Mrs. C. Schumacher, 3 years, from January 1, 1905.

Repair Company 5, One Hundred and Sixty-sixth street and Washington avenue, $600; William H. Payne, 3 years, from January 1, 1905.

Repair Company 6, Two Hundred and First street and Webster avenue, $720; William Winghart, 3 years, from January 1, 1905.

As it is necessary for this Department to make some additions to and improvements in these several pieces of property, in order to protect material stored therein, it would be economical for the City to have a three years' lease of the several properties; therefore, in making this recommendation to the Sinking Fund Commission for the renewal of these leases, I suggest that the term be made three years in place of the usual privilege of one year's renewal.

Respectfully,
JOHN T. OAKLEY, Commissioner.

Approved for renewal for a period of three years each; otherwise on the same terms and conditions as contained in the existing lease.

MORTIMER J. BROWN,
Appraiser of Real Estate in Charge of Bureau.

In connection therewith the Comptroller offered the following resolution:

Resolved, That the Comptroller be and is hereby authorized and directed to execute renewals of leases to the City of the following premises, occupied by the Department of Water Supply, Gas and Electricity:

1. The ground floor of the front and rear buildings and yard of No. 437 West Thirty-seventh street, Borough of Manhattan, for a term of three years from January 1, 1905 at an annual rental of $780, payable quarterly, and on the same terms and conditions as contained in the existing lease. Mrs. Caroline Schumacher, lessor.

2. Premises on the northeast corner of Washington avenue and One Hundred and Sixty-sixth street, Borough of The Bronx, for a term of three years from January 1, 1905, at an annual rental of $600, payable quarterly, and on the same terms and conditions as contained in the existing lease. William H. Payne, lessor.

3. Premises on the northwest corner of Webster avenue and Two Hundred and First street, Borough of The Bronx, for a term of three years from January 1, 1905, at an annual rental of $720, payable monthly; otherwise upon the same terms and conditions as contained in the existing lease. William J. Winghart, lessor.

—the Commissioners of the Sinking Fund deeming the said rents fair and reasonable and that it would be for the interests of the City that such leases be made.

Which was unanimously adopted.

The following communication was received from the Commissioner of Docks requesting approval of the terms and conditions of sale of the franchise to operate a ferry between the foot of Twenty-third street, East river, Borough of Manhattan, and the foot of Broadway, East river, Borough of Brooklyn:

NEW YORK, October 19, 1904.

N. TAYLOR PHILLIPS, Esq., *Secretary, Commissioners of the Sinking Fund:*

SIR—In the year 1894 a lease of the privilege of operating a ferry between the foot of Twenty-third street, East river, in the Borough of Manhattan, and the foot of Broadway, East river, in the Borough of Brooklyn, together with wharf property owned by the City and used in connection therewith, was granted to the Brooklyn and New York Ferry Company for a term of ten years from May 1, 1894, at a rental of $13,417 per annum. In 1899 this Department took up the question of improving the waterfront under the new plan at the foot of Twenty-third street, East river, which necessitated a change in the occupation of property by the ferry company at that point and the rental for the unexpired term of the lease for the accommodations afforded under the changed conditions was agreed upon between the Brooklyn Ferry Company of New York, who then held the lease, and this Department, at $8,500 per annum.

The company now operates from two slips and occupies wharf property and land under water extending from about the centre of East Twenty-third street to the northerly side of the pier at the foot of East Twenty-second street, East river. The total gross receipts for the year 1903 amounted to $381,096.77. It is probable that the new Williamsburgh Bridge, with the proposed trolley connections over same, will tend to diminish the revenue from this ferry.

After a careful consideration of the matter, I am of the opinion that for the new lease a rental of five per cent. per annum of the gross receipts should be charged, and I have therefore prepared and submit herewith terms and conditions for the sale of the lease of the franchise and wharf property for a term of ten years from May 1, 1904, at a rental of five per cent. of the gross receipts of the ferry, to be not less than $15,000 per annum, and would respectfully request that if the same meet with the approval of the Commissioners of the Sinking Fund a resolution be adopted accordingly.

Yours respectfully,
MAURICE FEATHERSON, Commissioner.

I see no objections to the approval of the terms and conditions of this lease as proposed.

EUG. E. McLEAN, Engineer, Department of Finance.

OCTOBER 20, 1904.

The franchise of ferry as more particularly hereinafter described will be offered for sale by the Commissioner of Docks at public auction to the highest bidder, at Pier "A," Battery place, at 12 o'clock noon, on the day of , 1904, for a term of ten years from May 1, 1904.

To and from the foot of Broadway in the Borough of Brooklyn, The City of New York, across the waters of the East river or sound, from and to the foot of East Twenty-third street in the Borough of Manhattan, The City of New York, together with the wharf property belonging to The City of New York, assigned to be used in connection with and for the purposes of said ferry.

Terms and Conditions of Sale.

The lease will be sold subject to the approval of the term thereof by the Commissioners of the Sinking Fund.

No bid will be received which shall be less than the upset price, namely, for the first term, five per cent. (5%) of the gross receipts of said ferry, to be not less than fifteen thousand dollars ($15,000) per annum for the said franchise, together with the wharf property belonging to The City.

The purchaser will be required at the time of the sale to pay, in addition to the auctioneer's fee (viz., $50), to the Department of Docks and Ferries, $3,750 as security for the execution of the lease, which $3,750 will be applied to the payment of the rent first accruing under the lease when executed, or will be forfeited to the Department if the purchaser refuses or neglects to execute the lease, with good and sufficient surety to be approved by the Commissioner of Docks within ten days after being notified that the lease is prepared and ready for execution at the office of the Department of Docks and Ferries, Pier "A," North river, foot of Battery place.

A surety or guaranty company, duly authorized by law to act as surety, to be approved by the Commissioner of Docks, will be required under the lease to enter into a bond or obligation jointly and severally with the lessee in the sum of double the annual rent, for the faithful performance of all the covenants and conditions of the lease.

The lease will contain the usual covenants and conditions, in conformity with the provisions of law and the ordinances of the Board of Aldermen relative to ferries, and shall provide that the lessees will maintain and operate the ferry during the whole term, and will provide ample accommodations in the way of safe and capacious boats and sufficiency of trips; that if at any time during the term hereof the Commissioner of Docks, or the person or persons then performing the duties now exercised by the Commissioner of Docks, shall be of the opinion that the boat or boats furnished by the party of the second part, or that the number of trips do not conform to the requirements of this lease, he may direct the party of the second part to make such improvements, construct such new boat or boats, or increase the number of trips as in his opinion the service demands; and in the event of the failure of the party of the second part to comply with such directions within a reasonable time, a commission shall be appointed, composed of the Mayor, the President of the Borough of Brooklyn and the Commissioner of Docks, on behalf of the City, and three other persons selected by the party of the second part, which Commission shall be known as the Arbitration Commission, and in case of their failure to agree as to the improvements to be made in the service, they shall appoint a seventh person to act as umpire, and if they are unable to agree within five days upon such umpire, then, at the request of either of the parties hereto, he shall be appointed by the Presiding Justice of the Appellate Division of the Supreme Court of the State of New York, First Department, and the decision of four of said seven persons so selected shall be conclusive and binding upon both of the parties to this lease; also conditions that the lessees shall dredge the ferry slips, etc., as required by the Commissioner of Docks; that during the term of the lease they will erect and build, at their own expense, and will at all times well and sufficiently repair, maintain and keep in good order, all and singular the floats, racks, fenders, bridges and other fixtures of the landing places, and in the event of any damage to the bulkheads or piers from collision by the ferry-boats or otherwise, from any accident or negligence on their part, they will immediately repair and restore said wharf property to its previous condition free of cost to The City of New York; that if at any time during the term of the lease the Commissioner of Docks shall require any of the wharf property used for ferry purposes in order to proceed with the water-front improvements in the vicinity of the ferry landings, the said lessee shall surrender and vacate the premises without any claim upon the City for any damages whatever, upon written notice being given to the lessees three months in advance of the intention of said Commissioner; shall, by the said notice, terms of description, or by reference to the plans and specifications of the proposed work of improvement, specify the character of the alterations and improvements to be made in regard to said water-front, affecting the property and rights hereby authorized to be demised, and upon receiving such notice, the lessee may elect to terminate the lease of said ferry privilege or franchise by serving notice of such election upon the Commissioner of Docks within one month after receiving such notice from the Commissioner of Docks of his intention to improve the water-front in the vicinity of the ferry landing; also that in case only a portion of said wharf property shall be required for the purposes aforesaid, then a reasonable reduction will be made from the rent reserved by said lease; that sworn returns of the amounts of ferry receipts shall be made to the Commissioner of Docks when required by said Commissioner, and that the books of accounts of the ferry shall be subject to the inspection of said Commissioner, or to any persons designated by him in writing.

The lease will contain a covenant providing that upon the expiration or sooner termination of the said term of ten years the lessee may, and upon demand, in writing, by the Commissioner of Docks, or other proper officer or Department of The City of New York thereto duly authorized, shall, at the cost and expense of the lessee, forthwith and at the utmost practicable speed, wholly remove from the premises hereinbefore described, buildings, platforms, floats, bridges, ferry racks, piling and fixtures which shall have been erected or placed by the lessee, its successors or assigns, upon or within within the limits of the wharf property leased, so that there shall be in the slip adjacent to the hereinbefore described wharf property used for the purposes of said ferry, and in every part thereof, from the bulkhead out, at least 10 feet of water at mean low water.

The rates of ferriage and charges for vehicles and freight shall not exceed the rates now charged on the present ferry.

The lessees shall provide such life-boats, floats, rafts and life-preservers as may be directed by the Commissioner of Docks.

The form of lease which the purchaser shall be required to execute can be seen at the office of the Commissioner of Docks.

The right to reject all bids is reserved, if deemed by the Commissioner of Docks to be for the best interests of the City so to do.

By order of the Commissioner of Docks.

The foregoing terms and conditions of sale were duly approved by the Commissioners of the Sinking Fund under a resolution adopted October , 1904.

MAURICE FEATHERSON, Commissioner of Docks.

Dated The City of New York, October 11, 1904.

In connection therewith the Comptroller offered the following resolution:

Resolved, That, pursuant to the provisions of section 826 of the Amended Greater New York Charter, the Commissioners of the Sinking Fund hereby approve of the following terms and conditions of the sale of the franchise to operate a ferry between the foot of Twenty-third street, East river, Borough of Manhattan, and the foot of Broadway, East river, in the Borough of Brooklyn, together with the wharf property belonging to The City of New York, assigned to be used in connection with and for the purposes of said ferry, as transmitted for approval by the Commissioner of Docks, viz.:

SALE OF FERRY FRANCHISES.

The franchise of ferry, as more particularly hereinafter described, will be offered for sale by the Commissioner of Docks at public auction to the highest bidder, at Pier "A," Battery place, at 12 o'clock, noon, on the day of , 1904, for a term of ten years from May 1, 1904.

To and from the foot of Broadway, in the Borough of Brooklyn, The City of New York, across the waters of the East river or Sound, from and to the foot of East Twenty-third street, in the Borough of Manhattan, The City of New York, together with the wharf property belonging to The City of New York, assigned to be used in connection with and for the purposes of said ferry.

Terms and Conditions of Sale.

The lease will be sold subject to the approval of the terms thereof by the Commissioners of the Sinking Fund.

No bid will be received which shall be less than the upset price, namely, for the first term, five per cent. (5%) of the gross receipts of said ferry, to be not less than fifteen thousand dollars ($15,000) per annum for the said franchise, together with the wharf property belonging to the City.

The purchaser will be required at the time of the sale to pay, in addition to the auctioneer's fee (viz., $50), to the Department of Docks and Ferries, $3,750, as security for the execution of the lease, which $3,750 will be applied to the payment of the rent first accruing under the lease when executed, or will be forfeited to the Department if the purchaser refuses or neglects to execute the lease, with good and sufficient surety to be approved by the Commissioner of Docks within ten days after being notified that the lease is prepared and ready for execution at the office of the Department of Docks and Ferries, Pier "A," North river, foot of Battery place.

A surety or guaranty company, duly authorized by law to act as surety, to be approved by the Commissioner of Docks, will be required under the lease to enter into a bond or obligation jointly and severally with the lessee in the sum of double the annual rent, for the faithful performance of all the covenants and conditions of the lease.

The lease will contain the usual covenants and conditions, in conformity with the provisions of law and the ordinances of the Board of Aldermen relative to ferries, and shall provide that the lessees will maintain and operate the ferry during the whole term, and will provide ample accommodations in the way of safe and capacious boats and sufficiency of trips; that if at any time during the term hereof the Commissioner of Docks, or the person or persons then performing the duties now exercised by the Commissioner of Docks, shall be of the opinion that the boat or boats furnished by the party of the second part or that the number of trips do not conform to the requirements of this lease, he may direct the party of the second part to make such improvements, construct such new boat or boats, or increase the number of trips as in his opinion the service demands; and in the event of the failure of the party of the second part to comply with such directions within a reasonable time, a Commission shall be appointed, composed of the Mayor, the President of the Borough of Brooklyn and the Commissioner of Docks, on behalf of the City, and three other persons selected by the party of the second part, which Commission shall be known as the Arbitration Commission, and in case of their failure to agree as to the improvements to be made in the service, they shall appoint a seventh person to act as umpire, and if they are unable to agree within five days upon such umpire, then, at the request of either of the parties hereto, he shall be appointed by the Presiding Justice of the Appellate Division of the Supreme Court of the State of New York, First Department, and the decision of four of said seven persons so selected shall be conclusive and binding upon both of the parties to this lease; also conditions that the lessees shall dredge the ferry slips, etc., as required by the Commissioner of Docks; that during the term of the lease they will erect and build, at their own expense, and will at all times well and sufficiently repair, maintain and keep in good order, all and singular the floats, racks, fenders, bridges and other fixtures of the landing places, and in the event of any damage to the bulkheads or piers from collision by the ferry-boats or otherwise, from any accident or negligence on their part, they will immediately repair and restore said wharf property to its previous condition free of cost to The City of New York; that if at any time during the term of the lease the Commissioner of Docks shall require any of the wharf property used for ferry purposes in order to proceed with the waterfront improvements in the vicinity of the ferry landings, the said lessee shall surrender and vacate the premises without any claim upon the City for any damages whatever, upon written notice being given to the lessees three months in advance of the intention of said Commissioner; shall, by the said notice, terms of description, or by reference to the plans and specifications of the proposed work of improvement, specify the character of the alterations and improvements to be made in regard to said waterfront, affecting the property and rights hereby authorized to be demised, and upon receiving such notice, the lessee may elect to terminate the lease of said ferry privilege or franchise by serving notice of such election upon the Commissioner of Docks within one month after receiving such notice from the Commissioner of Docks of his intention to improve the water-front in the vicinity of the ferry landing; also that in case only a portion of said wharf property shall be required for the purposes aforesaid, then a reasonable reduction will be made from the rent reserved by said lease; that sworn returns of the amounts of ferry receipts shall be made to the Commissioner of Docks when required by said Commissioner, and that the books of accounts of the ferry shall be subject to the inspection of said Commissioner, or to any persons designated by him in writing.

The lease will contain a covenant providing that upon the expiration or sooner termination of the said term of ten years the lessee may, and upon demand in writing, by the Commissioner of Docks, or other proper officer or department of The City of New York thereto duly authorized, shall, at the cost and expense of the lessee, forthwith and at the utmost practicable speed, wholly remove from the premises hereinbefore described, buildings, platforms, floats, bridges, ferry racks, piling and fixtures which shall have been erected or placed by the lessee, its successors or assigns, upon or within the limits of the wharf property leased, so that there shall be in the slip adjacent to the hereinbefore described wharf property used for the purposes of said ferry, and in every part thereof, from the bulkhead out, at least ten feet of water at mean low water.

The rates of ferriage and charges for vehicles and freight shall not exceed the rates now charged on the present ferry.

The lessees shall provide such life-boats, floats, rafts and life preservers as may be directed by the Commissioner of Docks.

The form of the lease which the purchaser shall be required to execute can be seen at the office of the Commissioner of Docks.

The right to reject all bids is reserved, if deemed by the Commissioner of Docks to be for the best interests of the City so to do.

By order of the Commissioner of Docks.

Which was unanimously adopted.

The Chamberlain asked for and received the unanimous consent of the Board for a reconsideration of the vote by which the matter of the proposed lease to the New York Central and Hudson River Railroad Company, of certain trackage rights between Thirty-third and Thirty-seventh streets, on the North river, was lost.

The Comptroller thereupon renewed his privileged motion that the matter be referred to the Corporation Counsel for an opinion as to the proper method of procedure.

Motion carried.

Adjourned.

JOHN KORB, JR., Secretary, pro tem.

BOROUGH OF THE BRONX.

LOCAL BOARD OF MORRISANIA, TWENTY-FOURTH DISTRICT.

Pursuant to call by President Haffen the members of the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, met on October 12, 1904, at 2 P. M., at the office of the President of the Borough of The Bronx, Municipal Building, One Hundred and Seventy-seventh street and Third avenue.

Present—President Haffen, Alderman Murphy and Alderman Harnischfeger.

Minutes of previous meeting were read and adopted.

HEARINGS.

No. 198.

Paving with Creo-Resinite Wood Pavement on Concrete, and Resetting Curb in East One Hundred and Sixty-fifth Street, from Union Avenue to Stebbins Avenue.

Petition of Joseph Liebertz and others was read.

No one appeared in opposition.

On motion, the matter was laid over awaiting the report of the Chief Engineer of the borough as to the estimated cost of the proposed improvement, and the assessed value of the property within the probable area of assessment which might be benefited.

No. 199.

Receiving Basin and Appurtenances, Northeast Corner One Hundred and Seventy-ninth Street and Honeywell Avenue.

Report of Chief Engineer, dated September 8, 1904, was read, as was also the report of the Engineer in charge of sewers, dated and approved October 12, 1904, by the Chief Engineer.

Estimated cost, $325, and the assessed value of the real estate, with improvements, included within the probable area of assessment is $31,300.

No one appearing in opposition, the following preambles and resolution were adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition, at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For constructing receiving basin and appurtenances on the northeast corner of One Hundred and Seventy-ninth street and Honeywell avenue, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Morrisania, Twenty-fourth District, on the 12th day of October, 1904.

Alderman Murphy, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

No. 200.

Regulating and Grading Evelyn Place, from Jerome Avenue to Aqueduct Avenue, East.

Petition of Andrew T. Doyle and others was read.

No one appeared in opposition.

Laid over for report of the Chief Engineer as to the estimated cost and the assessed value of the property within the probable area of assessment.

No. 201.

Regulating and Grading, Setting Curbstones, Flagging Sidewalks a Space Four Feet Wide, Laying Crosswalks, Building Approaches and Erecting Fences Where Necessary in Shakespeare Avenue, Between West One Hundred and Sixty-eighth Street and West One Hundred and Sixty-ninth Street, Borough of The Bronx.

Petition of Rev. J. A. Mullins was read, as was also the following report of the Engineer of Highways, viz.:

Detailed Estimate of Work.

500 cubic yards of earth excavation.
350 cubic yards of rock excavation.
350 cubic yards of filling.
320 linear feet of new curbstone.
300 linear feet of old curbstone redressed and rejointed.
1,000 square feet of new flagging.
950 square feet of old flagging.
220 square feet of new bridgestone.
420 square feet of old bridgestone.
55 cubic yards of dry rubble masonry.

Estimated cost, $2,200, and the assessed value of the real estate included within the probable area of assessment is $10,600.

No one appeared in opposition, and, on motion, the following preambles and resolution were adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition, at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For regulating and grading, setting curbstones, flagging sidewalks a space four feet wide, laying crosswalks, building approaches and erecting fences where necessary in the widening of Shakespeare avenue, between West One Hundred and Sixty-eighth and West One Hundred and Sixty-ninth streets, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Morrisania, Twenty-fourth District, on the 12th day of October, 1904.

Alderman Murphy, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

No. 202.

Paving with Asphalt Blocks Sherman Avenue, Between One Hundred and Sixty-first Street and One Hundred and Sixty-fourth Street, etc.

Petition of John Yule and others was read.

Mr. John Yule appeared in favor.

No one appeared in opposition.

Laid over until report of the Chief Engineer was received.

No. 203.

Acquiring Title to the Lands Necessary for Lawrence Avenue, from Lind Avenue to West One Hundred and Sixty-seventh Street (formerly Wolf Street).

Petition of John J. Brennan and others was read.

No one appeared in opposition.

John J. Brennan appeared in favor.

On motion, the following preambles and resolution were adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition, at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For acquiring title to the lands necessary for Lawrence avenue, from Lind avenue to West One Hundred and Sixty-seventh street (formerly Wolf street), in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Morrisania, Twenty-fourth District, on the 12th day of October, 1904.

Alderman Murphy, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

No. 204.

Sewer, etc., in Lawrence Avenue, from West One Hundred and Sixty-seventh Street Southerly to Lind Avenue.

Petition of John J. Brennan and others was read, as was also report of the Engineer in charge of sewers, giving the estimated cost at $21,800, and stating that "should Lawrence avenue be graded prior to the construction of the sewer it would reduce the amount of rock to be excavated in the sewer work by 1,227 cubic yards, and therefore reducing the total estimated cost to $17,350. Title not vested. No proceedings begun. Outlet existing."

No one appeared in opposition and, on motion, the following preambles and resolution were adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition, at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For constructing a sewer and appurtenances in Lawrence avenue, from West One Hundred and Sixty-seventh street southerly to Lind avenue, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Morrisania, Twenty-fourth District, on the 12th day of October, 1904.

Alderman Murphy, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

No. 205.

Regulating and Grading Lawrence Avenue, from Lind Avenue to West One Hundred and Sixty-seventh Street.

Petition of John J. Brennan and others was read.

Mr. John J. Brennan appeared in favor.

No one appeared in opposition.

On motion, the following preambles and resolution were adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition, at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For regulating and grading, setting curbstones and flagging sidewalks a space four feet wide, laying crosswalks, building approaches and erecting fences where necessary in Lawrence avenue, from Lind avenue to West One Hundred and Sixty-seventh street, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Morrisania, Twenty-fourth District, on the 12th day of October, 1904.

Alderman Murphy, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

Nos. 206 and 212.

Resolved, That the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, hereby recommends that a joint resolution be forwarded to the Board of Estimate and Apportionment embracing the initiating of petitions Nos. 206 and 212, and the Secretary of this Board is hereby directed to forward the resolution in the form suggested in the report of Charles H. Graham, Engineer in Charge of Sewers, dated October 11, 1904, viz.:

"For constructing sewers and appurtenances in Jennings street, between Southern Boulevard and Hoe avenue; and in East One Hundred and Seventy-second street, between Southern Boulevard and Hoe avenue; and in Hoe avenue, from East One Hundred and Seventy-second street to the summit south of Jennings street."

Adopted October 12, 1904, Alderman Murphy, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

Petition of Francis Donnelly and others, and of Eliza Naumann and others was read, for constructing sewers, etc., in Jennings street, between Southern Boulevard and Hoe avenue, and in Hoe avenue, from the summit south of Jennings street to the summit north of Jennings street, and

No. 212.

—in East One Hundred and Seventy-second street, between the Southern Boulevard and Hoe avenue; and in Hoe avenue, from East One Hundred and Seventy-second street to the summit south of East One Hundred and Seventy-second street. No one appeared in opposition. Estimated cost of both works embraced in Nos. 206 and 212, $18,050.

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For constructing sewers and appurtenances in Jennings street, between Southern Boulevard and Hoe avenue; and in East One Hundred and Seventy-second street, between Southern Boulevard and Hoe avenue; and in Hoe avenue, from East One Hundred and Seventy-second street to the summit south of Jennings street, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Morrisania, Twenty-fourth District, on the 12th day of October, 1904.

Alderman Murphy, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

Aldermen Morris, Stumpf and Dougherty appeared.

No. 207.

Laying Out a Public Park Bounded by East One Hundred and Thirty-second Street, Willow Avenue and the Lands of the New York, New Haven and Hartford Railroad Company.

Petition of Daughters of American Revolution and petition of A. Kuper and others was read, as was also report of the Principal Assistant Topographical Engineer, dated October 7, 1904.

Laid over.

No. 208.

Acquiring Title to Bathgate Avenue, Between One Hundred and Eighty-eighth Street and Pelham Avenue.

Petition of O. Freer read, and there being no opposition the following was adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Morrisania, Twenty-fourth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For acquiring title to the lands necessary for Bathgate avenue, between East One Hundred and Eighty-eighth street and Pelham avenue, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Morrisania, Twenty-fourth District, on the 12th day of October, 1904.

Alderman Harnischfeger, Alderman Stumpf, Alderman Morris, Alderman Dougherty, Alderman Murphy and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

No. 209.

Regulating and Grading Bathgate Avenue, Between East One Hundred and Eighty-eighth Street and Pelham Avenue.

Petition of O. Freer and others was read.

No one appeared in opposition.

Laid over for report of the Chief Engineer as to the estimated cost of the proposed improvement and the assessed value of the property included within the probable area of assessment.

No. 210.

Regulating, Grading, etc., Tiebout Avenue, Between East One Hundred and Eighteenth Street and Fordham Road.

Petition of Edward Handy and others was read.

No one appeared in opposition.

Laid over for report of the Chief Engineer as to the estimated cost of the proposed improvement and the assessed value of the property included within the probable area of assessment.

No. 211.

Repairing, Fencing, Flagging, etc., in Front of Premises Nos. 654, 656, 658, 660, 662 and 664 East One Hundred and Seventy-sixth Street.

Report of the Superintendent of Highways dated July 21, 1904, and report of the Engineer of Highways dated October 2, 1904, were read.

Estimated cost, $180.

Mr. E. T. Mulligan appeared and requested that the matter be laid over until the next meeting.

President Haffen explained that if the work was done by the owner or owners the resolution would not be carried out.

On motion, the following resolution was adopted:

Resolved, by the Local Board of Morrisania, Twenty-fourth District, That the sidewalks in front of premises Nos. 654, 656, 658, 660, 662 and 664 East One Hundred and Seventy-sixth street, be repaired, area fences built, and flagging be laid or relaid where necessary, and the expense thereof charged against the property benefited; said work to be done under the jurisdiction of the President of the Borough of The Bronx, under the provisions of section 435, chapter 466, Laws of 1901.

Adopted October 12, 1904.

Alderman Morris, Alderman Murphy, Alderman Stumpf, Alderman Dougherty, Alderman Harnischfeger and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

LAID OVER MATTERS RECONSIDERED.

No. 195.

East One Hundred and Seventy-fourth Street, Asphalt Block Paving, from Park Avenue to Fulton Avenue.

No opposition at public hearing.

Referred to Alderman Morris to ascertain if owners will send in a new petition for granite blocks between Fulton avenue and Third avenue, owing to steep grade there.

No. 196.

Cambreling Avenue, Block Asphalt, from East One Hundred and Eighty-second Street to St. John's College Grounds.

Estimated cost, $25,500.

On motion, the matter was denied, owing to the fact that a largely signed protest had been received since the public hearing on September 17, 1904.

No. 194.

Clay Avenue, Sewer, Between East One Hundred and Seventy-third Street and East One Hundred and Seventy-sixth Street.

Protest received since hearing on September 17, 1904.

Laid over, and referred to Engineer in charge of sewers for further report.

The following miscellaneous matters were ordered advertised for next meeting:

One Hundred and Ninety-eighth street change of grade, between Concourse and Jerome avenue.

Depot place change of grade and of west approach to bridge over New York Central and Hudson River Railroad Station at High Bridge.

Jennings street extension from Union avenue to Boston road.

Alden place laying out on map.

Locating, Laying Out and Grades in East One Hundred and Thirty-third Street, from Southern Boulevard to Cypress Avenue, and from Locust Avenue to East River.

The Board recommended that this map be forwarded to the Board of Estimate and Apportionment and that the same be approved by the said Board after a public hearing.

Resolved, That gas (mantle) lamps be erected, lighted and maintained on Morris avenue, between Burnside avenue and Cameron place.

Alderman Morris, Alderman Stumpf, Alderman Dougherty, Alderman Harnischfeger, Alderman Murphy and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

Adopted October 12, 1904.

Macadamizing Morris Avenue, from Burnside avenue to Field Place.

Recommended to Superintendent of Highways.

Ornamental Drinking Fountain with Lights, at Intersection of East One Hundred and Sixty-ninth Street, Intervale Avenue, Home and Tiffany Streets.

Alderman Stumpf brought this improvement to the attention of the Local Board, stating that the Women's Municipal League were very much in favor of having this fountain, as well as other residents and property-owners of his section.

On motion, the matter was recommended, with the request that the Commissioner of Water Supply, Gas and Electricity apply for an appropriation for the work.

By Alderman Morris—

One Hundred and Ninety-seventh Street and Decatur Avenue, Stairway Lights.

On motion, the Commissioner of Water Supply, Gas and Electricity was urged to apply for an appropriation of two thousand dollars for the erection of two ornamental lamps at this location.

By Alderman Dougherty—

On motion, the Local Board respectfully recommended for the second time that Walnut avenue, Locust avenue, Cypress avenue and Willow avenue (Port Morris), between East One Hundred and Thirty-third street and East One Hundred and Fortieth street, be properly lighted at the easliest possible date.

On motion, the Board adjourned, to meet again on October 27, 1904, at 2 P. M.

HENRY A. GUMBLETON, Secretary.

BOROUGH OF THE BRONX.

LOCAL BOARDS OF MORRISANIA AND CHESTER—TWENTY-FOURTH AND TWENTY-FIFTH DISTRICTS.

JOINT SESSION.

Pursuant to call by President Haffen the members of the Local Boards of Morrisania and Chester, Twenty-fourth and Twenty-fifth Districts, met in joint session on Wednesday, October 12, 1904, at 2 P. M., at the office of the President of the Borough of The Bronx, One Hundred and Seventy-seventh street and Third avenue.

Present—President Haffen, Alderman Harnischfeger, Alderman Morris, Alderman Murphy, Alderman Stumpf, Alderman Dougherty and Alderman Gass.

Absent—Alderman Sheil.

No. 213.

Locating and Laying Out of Boston Road, from East One Hundred and Eighty-second Street to the White Plains Road.

The following, from the Central Taxpayers' Alliance Society, was read:

By Dr. Howe—

I move that the Taxpayers' Alliance indorse the application for the widening of Boston road, from West Farms to White Plains road, as laid out on the maps.

Motion seconded and carried.

Meeting Taxpayers' Alliance, October 5, 1904.

[Seal.] ARTHUR G. BEDELL, Secretary.

Petition of Michael Rauch and others, dated September 29, 1904, was also read, as well as the report of the Principal Assistant Topographical Engineer, dated October 5, 1904.

On motion, the Board recommended that the President of the Borough of The Bronx transmit the map or plan for the approval of the Board of Estimate and Apportionment, showing in red lines "the locating and laying out of the Boston road, from East One Hundred and Eighty-second street to the White Plains road, in the Twenty-fourth Ward, Borough of The Bronx, dated October 6, 1904," and that the same be approved by said Board of Estimate and Apportionment, after a public hearing has been granted the property-owners.

Adopted.

HENRY A. GUMBLETON, Secretary.

BOROUGH OF THE BRONX.

LOCAL BOARD OF CHESTER—TWENTY-FIFTH DISTRICT.

Pursuant to call by President Haffen the members of the Local Board of Chester, Twenty-fifth District, Borough of The Bronx, met at the office of the President of the Borough of The Bronx, corner One Hundred and Seventy-seventh street and Third avenue, in the Municipal Building, on October 12, 1904, at 3 P. M.

Present—President Haffen and Alderman Gass.

Minutes of previous meeting were read and adopted:

LAID OVER MATTERS.

No. 183.

Acquiring Title to First Street (unnamed), East of the Bronx River, Between Tremont Avenue and East One Hundred and Eightieth Street.

Report of the Chief Engineer was read.

There being no opposition at the public hearing the following preambles and resolution were adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition, at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Chester, Twenty-fifth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For acquiring title to the lands necessary for opening the first street (unnamed) east of the Bronx river, between Tremont avenue and East One Hundred and Eightieth street, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Chester, Twenty-fifth District, on the 12th day of October, 1904.

Alderman Gass and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

No. 184.

Regulating and Grading, etc., the First Street (unnamed) East of the Bronx River, Between Tremont Avenue and East One Hundred and Eightieth Street.

Petition of Charles H. Graham and others was read, as was also the report of the Engineer of Highways, approved by the Chief Engineer of the Borough of The Bronx, dated September 15, 1904, viz.:

950 cubic yards of earth excavation.
250 cubic yards of rock.
2,000 cubic yards of filling.
1,625 linear feet of new curb.
6,225 square feet of new flagging.
925 square feet of new bridgestone, and
50 linear feet of vitrified pipe, 12-inch.

Total estimated cost, $5,700. The assessed value of the real estate included within the probable area of assessment is $83,475.

Title not acquired. No proceedings taken.

There being no opposition at the public hearing the following preambles and resolution were adopted:

Whereas, A petition for a local improvement described below has been received by the President of the Borough of The Bronx; and

Whereas, He has appointed a time for a meeting of this Local Board not more than fifteen days after the receipt by him of the said petition, at which meeting the said petition would be submitted by him to the said Local Board, and he has caused a notice to be published in the CITY RECORD that said petition has been presented

to him and is on file in his office for inspection, and of the time when and the place where there would be a meeting of this Local Board at which the said petition would be submitted by him to the said Board, which time was not less than ten days after the publication of this notice; and

Whereas, The said petition was duly submitted thereafter to the said Local Board, which did duly consider the same and give a full hearing thereon; now therefore it is

Resolved, by the Local Board of Chester, Twenty-fifth District, Borough of The Bronx, pursuant to titles 2 and 3 of chapter 10 of the Greater New York Charter, That the said petition be and the same hereby is granted; and it is hereby

Resolved, That this Board does hereby initiate proceedings for the said local improvement, to wit:

For regulating and grading, setting curbstones and flagging sidewalks a space four feet wide, laying crosswalks, building approaches and erecting fences where necessary in the first street (unnamed) east of the Bronx River, between Tremont avenue and East One Hundred and Eightieth street, in the Borough of The Bronx, City of New York; and it is hereby

Resolved, That a copy of this resolution be transmitted forthwith to the Board of Estimate and Apportionment for its approval.

Adopted by the Local Board of Chester, Twenty-fifth District, on the 12th day of October, 1904.

Alderman Gass and the President of the Borough of The Bronx voting in favor thereof.

Negative—None.

Extension of Bronx Park, Easterly of Bronx River, Lying Southerly of the Bronx and Pelham Parkway; also Modification of Street System Adjoining said Extension.

Report of Chief Engineer, dated October 7, 1904, read, and laid over.

Adjournment.

HENRY A. GUMBLETON, Secretary.

BOARD OF CITY RECORD.

Council Chamber, City Hall, New York City,
Friday, July 22, 1904, 1.30 P. M.

The Hons. George B. McClellan, Mayor; John J. Delany, Corporation Counsel, and Edward M. Grout, Comptroller, the officers designated by section 1526 of chapter 466 of the Laws of 1901, met this day.

The minutes of the meeting held June 28, 1904, were approved as printed.

The following matters submitted by the Supervisor of the City Record were laid over:

1. Request from the Art Commission of The City of New York for the printing of 10,000 8vo. pamphlets for the use of the Art Commission's exhibit at the Louisiana Purchase Exposition.

2. Application from the President of the Department of Parks, Manhattan and Richmond, for the printing of 10,000 copies of a report of the operations of the Children's Farm School in DeWitt Clinton Park.

3. Applications for advertising from "U. S. Investor" bond advertisements; "Town Topics," for designation as an official weekly paper; "The Reflector," for designation as an official weekly paper; "The Police Chronicle," for tax notices; "The Union," for City or borough advertising; "Long Island Democrat," for designation as an official borough paper for the Borough of Queens; "Engineering Record," for City contract work.

The following resolutions were adopted by concurrent vote:

Resolved, That the Board of Assessors be and it hereby is authorized to publish brief notices calling attention to advertisements in the CITY RECORD relative to proposed assessments for local improvements in the publication called "School."

Resolved, That the Supervisor of the City Record be authorized to publish in the following papers:

(1) A notice of the Receiver of Taxes, under date of September 1, 1904, required by section 38 of chapter 908 of the Laws of 1896, asking taxpayers to make written requisition for their bills for the payment of taxes for 1904.

(2) The notice required by section 914 of the Greater New York Charter to be given October 1 that the assessment rolls of real estate, personal property and bank stock of the several boroughs of The City of New York for the year 1904 have been delivered to the said Receiver of Taxes, and that the taxes indicated by the said assessment rolls are due and made payable.

(3) The notice respecting unpaid taxes required by section 918 of the Greater New York Charter to be given November 1.

(4) The notice respecting unpaid taxes required by section 919 of the Greater New York Charter to be given after December 1.

Borough of Manhattan.

"City Record."	New York "Times."
New York "American."	New York "Herald."
New York "World."	"Mail and Express."
New York "Press."	New York "Daily News."
"Morning Telegraph."	"Evening Sun."
"Evening Post."	New York "Staats Zeitung."
"Globe and Commercial Advertiser."	"School."
"Harlem Local Reporter."	"Daily Jewish Herald."
"Weekly Union."	"Irish American."
New York "Freeman's Journal."	The New Yorker "Herold."
"American Hebrew."	"Leslie's Weekly."
"Real Estate Record and Guide."	"Gaelic American."
"Volks Advokat."	New York "Realty Journal."
"Democracy."	"The Evening Journal."
"Evening World."	"Catholic World Magazine."
"Das Morgen Journal."	"Catholic News."
"Hebrew Standard."	"Wall Street Journal."
"Police Chronicle."	"Il Progresso Italo-Americano."
"Town Topics."	"Courrier des Etats Unis."
"L'Araldo Italiano."	"Evening Telegram."
New York "Sun."	"The Chief."
New York "Tribune."	Manhattan and The Bronx "Advocate."
"Journal of Commerce and Commercial Bulletin."	

Borough of The Bronx.

"Westchester Globe."	"North Side News."
"The Union."	"Westchester Independent."
"Bronx Sentinel."	"The Bronx Borough Record."

Borough of Brooklyn.

Brooklyn "Citizen."	Brooklyner "Freie Presse."
Brooklyn "Eagle."	Brooklyn "Weekly News."
Brooklyn "Times."	Flatbush "Weekly News."
Brooklyn "Standard-Union."	

Borough of Queens.

Flushing "Evening Journal."	Queens Borough "Advertiser."
Flushing "Daily Times."	Jamaica "Standard."
Rockaway "News."	Long Island "Farmer."
Long Island "Star."	Long Island "Democrat."

Borough of Richmond.

"The Staten Islander."	The Staten Island "Star."
The Staten Island "World."	The Staten Island "Gazette."
Richmond County "Herald."	Richmond County "Democrat."

The following resolutions were adopted by concurrent vote:

Resolved, That the list of official borough papers for the Borough of Queens designated by this Board on April 26, 1904, be and it hereby is revised by eliminating therefrom the "Newtown Register" and substituting therefor the "Queens Borough Advertiser."

Resolved, That the Supervisor of the City Record be and he hereby is directed to forward to the Department of Finance for payment the following claims:

Stevenson & Marsters—

For supplies of printing, blank books and stationery furnished during the second quarter of 1904 to the

Supreme Court, Second Department, Kings County—

Printing	$188 25
Books	68 85
Stationery	181 76
Total	$438 86

Resolved, That the Supervisor of the City Record be and he hereby is directed to award to James H. English & Son by direct order the books required by the various courts, departments, bureaus, etc., for use on January 1, 1905, at prices satisfactory to the Supervisor and subject to the approval of the Department of Finance, the Board deeming this course to be for the best interest of the City.

Resolved, That the Supervisor of the City Record be and he hereby is authorized to procure by direct order, i. e., by contract let without advertisement, the articles called for by the following requisitions, allowed at this meeting, not exceeding the estimates this day submitted by the Supervisor, as shown by schedules this day signed by members of the Board of City Record, that course being deemed to be for the best interest of the City.

Armory Board—Requisition No. 1465.

Bellevue and Allied Hospitals—Requisition Nos. 1389, 1403, 1412, 1453, 1478, 1504, 1550, 1569, 1572.

Borough of Manhattan—President's Office: Requisition Nos. 1388, 1567. Bureau of Highways: Requisition No. 1466. Bureau of Public Buildings and Offices: Requisition No. 1588. Bureau of Public Works: Requisition Nos. 1476, 1506, 1516, 1565.

Borough of The Bronx—President's Office: Requisition Nos. 1381, 1448, 1481, 1548, 1558, 1563, 1584, 1599. Bureau of Buildings: Requisition No. 1430.

Borough of Brooklyn—President's Office: Requisition Nos. 1383, 1555. Bureau of Buildings: Requisition No. 1392. Bureau of Public Buildings and Offices: Requisition Nos. 1459. 1470, 1498, 1522. Bureau of Sewers: Requisition Nos. 1475, 1595.

Borough of Queens—President's Office: Requisition No. 1469. Topographical Bureau: Requisition Nos. 1580, 1592, 1593.

Borough of Richmond—President's Office: Requisition Nos. 1371, 1467, 1521, 1594. Bureau of Public Works: Requisition Nos. 1501, 1520, 1547.

Bridges, Department of—Requisition Nos. 1364, 1437, 1480, 1524, 1525, 1562, 1577, 1586.

City Chamberlain—Requisition No. 1471.

City Clerk—Requisition Nos. 1376, 1568.

CITY RECORD—Requisition Nos. 1393, 1418, 1423, 1425, 1500, 1533, 1573, 1598.

Commissioner of Licenses—Requisition Nos. 1424, 1452, 1534.

Coroners, Brooklyn—Requisition No. 1545.

Coroners, The Bronx—Requisition Nos. 1439, 1482, 1526.

Correction, Department of—Requisition Nos. 1510, 1539.

Estimate and Apportionment—Requisition Nos. 1554, 1570.

Finance Department—Requisition Nos. 1377, 1379, 1385, 1415, 1420, 1421, 1438, 1457, 1468, 1474, 1479, 1489, 1493, 1508, 1511, 1519, 1528, 1542, 1556, 1561, 1566, 1571, 1574, 1581.

Fire, Manhattan—Requisition Nos. 1390, 1398, 1400, 1427, 1433, 1441, 1460, 1538.

Fire, Brooklyn—Requisition No. 1494.

Health Department—Requisition Nos. 1368, 1374, 1386, 1408, 1409, 1461, 1462, 1463, 1464, 1502, 1515, 1537, 1549, 1557, 1591, 1596.

Law Department—Corporation Counsel, Manhattan: Requisition Nos. 1387, 1477, 1600. Bureau of Street Openings, Manhattan: Requisition Nos. 1499, 1597. Tenement House Bureau, Manhattan: Requisition Nos. 1428, 1473, 1484.

Law, Queens—Requisition No. 1435.

Municipal Civil Service Commission—Requisition Nos. 1391, 1397, 1426, 1517.

Parks, Manhattan and Richmond—Requisition Nos. 1401, 1436.

Parks, Brooklyn and Queens—Requisition Nos. 1394, 1443, 1514.

Parks, The Bronx—Requisition No. 1431.

Examining Board of Plumbers—Requisition No. 1582.

Public Charities, Manhattan—Requisition Nos. 1402, 1411, 1434, 1505, 1529, 1544, 1578.

Public Charities, Brooklyn—Requisition Nos. 1369, 1370, 1399, 1407, 1495, 1509, 1575.

Street Cleaning, Manhattan—Requisition Nos. 1396, 1417, 1507, 1543, 1552, 1553, 1589.

Taxes and Assessments—Requisition Nos. 1406, 1447, 1458, 1492, 1518.

Tenement House Department—Requisition Nos. 1367, 1380, 1419, 1422, 1432, 1449, 1450, 1485, 1527, 1530, 1531, 1535, 1541, 1560.

Water Supply, Gas and Electricity, Manhattan—Requisition Nos. 1372, 1442, 1487, 1491, 1503, 1512, 1532, 1536, 1546, 1583.

Water Supply, Gas and Electricity, Brooklyn—Requisition Nos. 1373, 1440, 1444, 1445, 1456, 1551.

Water Supply, Gas and Electricity, The Bronx—Requisition No. 1395.

Water Supply, Gas and Electricity, Queens—Requisition No. 1496.

Children's Court, First Division—Requisition No. 1375.

City Magistrates, First Division—Requisition Nos. 1454, 1540.

City Magistrates, Second Division—Requisition No. 1490.

Municipal Courts, Borough of Manhattan—Ninth District Court: Requisition No. 1587. Tenth District Court: Requisitions Nos. 1429, 1446. Eleventh District Court: Requisition No. 1455. Twelfth District Court: Requisition No. 1378.

Municipal Courts, Borough of Brooklyn—Second District Court: Requisition No. 1486.

Special Sessions, First Division—Requisition Nos. 1362, 1497.

NEW YORK COUNTY.—District Attorney: Requisition Nos. 1361, 1382, 1513, 1523, 1585, 1590. General Sessions: Requisition Nos. 1405, 1483. Sheriff: Requisition Nos. 1363, 1404, 1413, 1414, 1579. Surrogates: Requisition Nos. 1384, 1559, 1576.

KINGS COUNTY.—County Clerk: Requisition No. 1472. Register: Requisition Nos. 1416. 1451.

RICHMOND COUNTY.—District Attorney: Requisition Nos. 1410, 1488.

Total amount of estimates approved:

For City Departments	$16,377 82
For New York County	2,024 71
For Kings County	240 95
For Richmond County	50 20

The meeting then adjourned, subject to the call of the Mayor.

PATRICK J. TRACY, Secretary.

DEPARTMENT OF PARKS.

THURSDAY, OCTOBER 13, 1904—STATED MEETING, 3 P. M.

John J. Brady, Esq., who had been appointed Commissioner of Parks for the Borough of The Bronx, appeared and presented his certificate of appointment, as follows:

CITY OF NEW YORK, OFFICE OF THE MAYOR.

Know all men by these presents, that I, George B. McClellan, Mayor of The City of New York, under and by virture of the authority of the statutes in such cases made and provided, do hereby appoint John J. Brady a Commissioner of Parks of The City of New York, to have administrative jurisdiction in the Borough of The Bronx, vice William P. Schmitt, resigned, to hold office until his successor shall be appointed and has qualified.

In witness whereof I have hereunto set my hand and affixed my seal of office this 7th day of October, A. D., one housand nine hundred and four.

[SEAL] GEORGE B. McCLELLAN, Mayor.

The roll being called—

Present—Commissioners Kennedy, Brady.

In the absence of the President Commissioner Kennedy was called to the chair.

The minutes of the previous meeting were read and approved.

Commissioner Brady offered the following:

Resolved, That the Commissioner of Parks for the Borough of The Bronx be and hereby is authorized to cause to be prepared plans, specifications and form of contract "for furnishing all the labor and material for completely erecting a one-arch stone bridge in the Botanical Garden in Bronx Park, in The City of New York."

And when the same shall have been prepared, and the form of contract approved as to form by the Corporation Counsel, to publish an advertisement inviting proposals for doing the work.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Brady offered the following:

Resolved, That the Commissioner of Parks for the Borough of The Bronx be and hereby is authorized to cause to be prepared plans, specifications and form of contract "for furnishing all the labor and material for casting and completely erecting a bronze fountain in the Botanical Garden, in Bronx Park, in The City of New York."

And when the same shall have been prepared and the form of contract approved as to form by the Corporation Counsel, to publish an advertisement inviting proposals for doing the work.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Kennedy offered the following:

Resolved, That the Commissioner of Parks for the Boroughs of Brooklyn and Queens be and he hereby is authorized to increase the contract with Thomas C. Dunham (Incorporated), for paints and painting materials, dated March 16, 1904, not to exceed twenty-five per cent., as provided in said contract.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Kennedy offered the following:

Resolved, That the Commissioner of Parks for the Boroughs of Brooklyn and Queens be and he hereby is authorized to increase the contract of William N. Kenyon, for masons' materials, dated March 17, 1904, not to exceed twenty-five per cent., as provided in said contract.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Kennedy offered the following:

Resolved, That the Commissioner of Parks for the Boroughs of Brooklyn and Queens be and he hereby is authorized to increase the contract of Brown & Fleming Contracting Company, for trap rock and trap rock screenings, dated April 28, 1904, not to exceed twenty-five per cent., as provided in said contract.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Kennedy offered the following:

Resolved, That the Commissioner of Parks for the Boroughs of Brooklyn and Queens be and he hereby is authorized to increase the contract of Dennis Norton, for blue limestone and blue limestone screenings, dated May 3, 1904, not to exceed twenty-five per cent., as provided in said contract.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Kennedy offered the following:

Resolved, That the Commissioner of Parks for the Boroughs of Brooklyn and Queens be and he hereby is authorized to increase the contract of John M. Fox, for top soil in Prospect Park, dated June 6, 1904, not to exceed twenty-five per cent., as provided in said contract.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Kennedy offered the following:

Resolved, That the proposal of the lowest formal bidder for furnishing all the labor and materials to complete plaza around Slocum Monument at Bedford avenue and Eastern parkway, Borough of Brooklyn, for which bids were received on the 6th inst., be forwarded to the Comptroller for approval of sureties, and when so approved that a contract for the same be entered into and executed by the President for and on behalf of this Board.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

Commissioner Kennedy offered the following:

Resolved, That the Commissioner of Parks for the Boroughs of Brooklyn and Queens be and he hereby is authorized to prepare plans, specifications and form of contract for furnishing all the labor and materials to build roadway and walks in rear of Institute of Arts and Sciences, Borough of Brooklyn, and when the same shall have been approved by the Corporation Counsel, to publish advertisements inviting proposals therefor.

Which was adopted by the following vote:

Ayes—Commissioners Kennedy, Brady—2.

On motion, at 3.30 P. M. the Board adjourned.

WILLIS HOLLY, Secretary.

POLICE DEPARTMENT.

New York, October 24, 1904.

The iollowing proceedings were this day directed by Police Commissioner William McAdoo:

Approved.

Applications of Captain Stephen O'Brien, Third Precinct, for transfer of certain Patrolmen to regulate traffic at crossings.

Request from Health Department for transfer of Patrolmen James Goggins, Fourteenth Precinct, and James Sloyan, Nineteenth Precinct, to Sanitary Squad, Health Department.

Referred to the Chief Inspector.

Communication from George Schmidtt, commending Patrolman at Chambers and Centre streets, for stopping a runaway horse. For report.

Communication from I. Kasner, commending Officer No. 754 for stopping a runaway horse. For report.

Communication from Patrick Kelly, commending Patrolman John Keenan, Second Precinct, for bravery displayed in shooting affray. For report.

Application of Simon Klein for appointment of Jacob Block as Special Patrolman.

Application of Brandt Bros. for appointment of Charles Doscher as Special Patrolman.

Application of F. H. Schaefer for appointment of James O'Brien as Special Patrolman.

Application of C. H. Philbrook for appointment of Philip Hodes as Special Patrolman.

Application of John Miller & Co. for appointment of John Donnelly as Special Patrolman.

Application of Bonwit, Teller & Co. for appointment of P. F. Rorke as Special Patrolman.

Application of A. Horstmann for appointment of Frederick Schwarzer as Special Patrolman.

Application of L. Spachner for appointment of Leon Spachner as Special Patrolman.

Referred Through Third Deputy Commissioner.

Communication from Goulds Manufacturing Company, asking for names of contractors who are procuring specifications for Headquarters, Brooklyn, stating that they would like to submit estimates to all contractors for power pumps. To Inspector of Repairs and Supplies.

Granted.

Request of Levy & Unger for permission to bring suit for Patrolman Harry Levy against the New York City Railroad for injuries received.

Masquerade Ball Permit Granted.

H. Beyer, New Assembly Hall, Brooklyn, October 29, fee $10.

Chief Clerk to Answer.

John T. Janssen, Chief of Police, Milwaukee, Wis., asking information relative to government of Police Department of New York City, and forwarding copy of Rules and Regulations of Milwaukee Police.

Full Pay Granted.

Patrolman William F. Benkler, Fourth Precinct, September 26 to October 1, 1904.

Leave of Absence Granted.

Captain Ernest Lindemann, Sixty-eighth Precinct, twenty days' vacation.

Patrolman John W. O'Brien, Twenty-seventh Precinct, five days without pay. Release signed.

On File.

Communication from Thomas G. Carlin, asking relative to payment for erection of Seventy-fifth Precinct station-house. Answered by Commissioner.

Estimate from M. B. Brown Company for printing for election returns.

Copy of communication from Comptroller, relative to payments of back salary to Officers reinstated.

Report of Captain Henry Halpin, Thirty-third Precinct, relative to communication from Empire State Society, Sons of the American Revolution, commending certain Officers of Thirty-third Precinct.

Report of Captain Patrick Byrne, Thirty-sixth Precinct, relative to complaint of H. G. King, Assistant Secretary, Rapid Transit Subway Construction Company, that petty thefts are committed at the Jackson and Prospect Avenue Station.

Reports of Captain Stephen O'Brien, Third Precinct, and Sergeant in Command Michael P. Sweeney, Sixth Court, relative to arrest of Patrolman Wm. McCarthy, Third Precinct, for disorderly conduct.

Report of Captain John J. McNally, Second Precinct, relative to arrest of one Herman Esser for violation of section 344A, Penal Code.

Ordered, That the following bills be approved and referred to the Comptroller for payment:

Account "Supplies for Police," 1904.

No. 2901.	Boyce & Barnes Company, coal	$297 66
No. 2902.	F. Donovan & Son, forage	1,531 48
No. 2903.	Moquin-Offerman-Heissenbuttel Coal Company, coal	7,931 89
No. 2904.	United States Trading Company, stationery	262 20
No. 2905.	Richard K. F. Averstaedt, meals to prisoners	7 00
No. 2906.	Fiss, Doerr & Carroll Horse Company, horses	900 00
No. 2907.	S. A. French, clubs	3 75
No. 2908.	S. A. French, flashlights	3 00
No. 2909.	New York Edison Company, electric current	29 68
No. 2910.	Chas. F. Pitney, hiring wagon	16 00
No. 2911.	The Safety Insulated Wire and Cable Company, cutting cables	57 30
No. 2912.	W. C. Vosburgh Manufacturing Company, Limited, electric lights	1,300 00
		$11,052 96

Account "Police Station Houses, Alterations, etc.," 1904.

No. 2913.	Columbia Engine Works, Incorporated, repairs, etc.	$6,240 00
No. 2914.	Columbia Engine Works, Incorporated, repairs, etc.	580 00
No. 2915.	Columbia Engine Works, Incorporated, repairs, etc.	675 00
No. 2916.	D. J. Barry & Co., glazing	18 90
No. 2917.	James Carroll, repairing wall	950 00
No. 2918.	Hickey Bros. & Co., electric lights, etc.	91 53
No. 2919.	Peter McKay, painting, etc.	569 00
No. 2920.	Sexton & Odell, partition, etc.	197 50
		$9,321 93

Account "Supplies for Police," 1904.

No. 2921.	Blevin & Carrington, assignees to A. Gunnison, Doorman and stable supplies	$28 35
No. 2922.	John Donohue, horses	1,645 00
No. 2923.	John Greig, Doorman and stable supplies	237 48
No. 2924.	Joseph Heineman, Doorman and stable supplies	942 00
No. 2925.	John H. Meyer, coal	2,801 57
No. 2926.	The Banks Law Publishing Company, law books	1 25
No. 2927.	The Banks Law Publishing Company, law books	3 25
No. 2928.	The Banks Law Publishing Company, law books	1 25
No. 2929.	The Banks Law Publishing Company, law books	3 50
No. 2930.	H. K. Brewer & Co., paper	19 75
No. 2931.	Trow Directory Publishing and Bookbinding Company, directories	150 00
No. 2932.	Trow Directory Publishing and Bookbinding Company, directories	27 50
No. 2933.	Trow Directory Publishing and Bookbinding Company, directory	7 50
No. 2934.	George Upington, directories	120 00
No. 2935.	Department of Correction, Manhattan, beds	437 50
No. 2936.	Department of Correction, Manhattan, beds	525 00
No. 2937.	Department of Correction, Manhattan, beds	30 50
No. 2938.	Doherty & Co., chair	27 50
No. 2939.	Doherty & Co., desk and chairs	86 00
No. 2940.	Doherty & Co., linoleum, etc.	12 00
No. 2941.	Doherty & Co., chair	25 00
No. 2942.	J. Warren Mead, Agent and Warden, desk	60 51
No. 2943.	J. Warren Mead, Agent and Warden, chair and desk	43 51
No. 2944.	J. Warren Mead, Agent and Warden, chairs	13 43
No. 2945.	J. Warren Mead, Agent and Warden, chairs	53 39
No. 2946.	J. Warren Mead, Agent and Warden, chairs	45 37
No. 2947.	J. Warren Mead, Agent and Warden, chairs	78 34
No. 2948.	J. Warren Mead, Agent and Warden, beds and closets	164 25
No. 2949.	J. Warren Mead, Agent and Warden, tables and desks	103 78
No. 2950.	P. W. Vallely, furniture	65 00
No. 2591.	M. F. Marlborough, wagon repairs	2 75
No. 2952.	M. F. Marlborough, wagon repairs	16 65
No. 2953.	M. F. Marlborough, wagon repairs	9 35
No. 2954.	M. F. Marlborough, wagon repairs	3 25
No. 2955.	M. F. Marlborough, wagon repairs	32 00
No. 2956.	M. F. Marlborough, wagon repairs	8 50
No. 2957.	M. F. Marlborough, wagon repairs	17 05
No. 2958.	M. F. Marlborough, wagon repairs	8 20
No. 2959.	M. F. Marlborough, wagon repairs	18 40
No. 2960.	Star Rubber Company, wagon repairs	16 25
No. 2961.	Star Rubber Company, wagon repairs	16 25
No. 2962.	M. R. Baxter's Sons, harness repairs	33 00
No. 2963.	M. Polsenski, harness repairs	22 10
No. 2964.	The I. S. Remsen Manufacturing Company, harness	97 00
No. 2965.	D. J. Barry & Co., filters and ice box	40 50
No. 2966.	D. J. Barry & Co., harness hanger, etc.	7 90
No. 2967.	D. J. Barry & Co., paper, etc.	14 00
No. 2968.	D. J. Barry & Co., lamp globe	9 00
No. 2969.	D. J. Barry & Co., awnings, etc.	557 60
No. 2970.	D. J. Barry & Co., awnings, etc.	14 00
No. 2971.	Bear Lithia Springs Company, water	30 00
No. 2972.	Bear Lithia Springs Company, water	5 00
		$8,728 23

Account "Police Station Houses, Alterations, etc.," 1904.

No. 2973. D. J. Barry & Co., railings, etc	$180 00
No. 2974. D. J. Barry & Co., cleaning flues	97 00
No. 2975. D. J. Barry & Co., repairing lock	21 75
No. 2976. James Carroll, repairing door	59 65
No. 2977. James Carroll, skylights	80 00
No. 2978. O'Brien & Ryder, plumbing work	690 00
No. 2979. Sexton & Odell, stable repairs	55 00
No. 2980. Sexton & Odell, rebuilding chimneys	74 00
	$1,257 40

Account "Police Station House Rents," 1904.

Jacob Blank, rent Seventy-seventh Precinct	$50 00
Nereid Association, rent Thirty-ninth Precinct	200 00
G. H. Waters, rent Thirty-ninth Precinct	40 00
	$290 00

Ordered, That the following bills be approved and referred to the Bookkeeper to be paid:

Account "Contingent Expenses, etc.," 1904.

No. 2900. J. I. Bacon, postage stamps	$10 00

WM. H. KIPP, Chief Clerk.

POLICE DEPARTMENT.

New York, October 29, 1904.

The following list of appointments, etc., in this Department, from October 24 to 29, 1904, is forwarded for publication pursuant to resolution of the Police Board, adopted January 10, 1898:

October 25, 1904.

Death Reported.

Patrolman Thomas Brady, Twenty-sixth Precinct, on October 23, 1904.

Retired.

Roundsman John McGonigal, Twenty-seventh Precinct, pension $750 per annum.
Detective Sergeant George Smith, Sixteenth Precinct, pension $1,000 per annum.
Patrolman Thomas Horn, Thirtieth Precinct, pension $700 per annum.
Patrolman James J. Miller, Thirty-second Precinct, pension $700 per annum.

October 27, 1904.

Appointed Patrolmen.

Paul Bradley, Edward Carroll, John H. Feeley, Frederick P. Hembdt, Eugene Mastaglio, John J. McCauley, Florence McAuliffe, Thomas B. McEnroe, Felix J. Rasch, William Meade.

October 28, 1904.

Appointed Fireman on Steamer "Patrol."

Michael J. Heilan.

WM. H. KIPP, Chief Clerk.

BOROUGH OF RICHMOND.

BUREAU OF BUILDINGS.

NEW YORK CITY, October 25, 1904.

I herewith submit a report of the operations of the Bureau of Buildings, Borough of Richmond, for the week ending October 22, 1904:

Plans filed for new buildings; estimated cost, $30,287	11
Plans filed for alterations; estimated cost, $3,092	8
Plans filed for plumbing; estimated cost, $875	3
Violations of law reported	2
Violation notices issued	2
Number of pieces of iron and steel inspected	9

JOHN SEATON,
Superintendent of Buildings, Borough of Richmond.

JAMES NOLAN, Chief Clerk.

CHANGES IN DEPARTMENTS.

DEPARTMENT OF FINANCE.

October 22—Appointment of Mr. John F. Breen, No. 379 State street, Borough of Brooklyn, as Expert Accountant in the Investigations Division, with salary at $3,500 per annum, taking effect October 22, 1904.

AQUEDUCT COMMISSIONERS.

October 29—At a meeting of the Aqueduct Commissioners, held on the 28th inst., the following provisional appointments were made, to take effect when assigned to duty:

James A. Cavanagh, No. 458 Prospect avenue, Brooklyn, N. Y., Rodman, $75 per month.

Arthur B. Goodwin, Croton Lake, N. Y., and Patrick A. Whalen, No. 177 Ashburton avenue, Yonkers, N. Y., Axemen, $60 per month.

TENEMENT HOUSE DEPARTMENT.

October 29—Edward S. McSorley, No. 974 Rogers place, Office Boy, salary $300 per annum. This appointment to take effect October 24, 1904.

William J. Maloney, No. 265 Woodbine street, Brooklyn, Office Boy, salary $300 per annum. This appointment to take effect October 24, 1904.

LAW DEPARTMENT.

October 27—

Miss Lillian E. Sexton, a Stenographer and Typewriter, at an annual salary of $750, has resigned, to take effect on October 31, 1904.

Miss Ella L. Garland, No. 1132 Decatur street, Brooklyn, has been appointed to the position of Stenographer and Typewriter at an annual salary of $900, to take effect on the first day of November, 1904.

Miss Clara M. Zimmerman, No. 351 West Forty-first street, Manhattan, has been appointed to the position of Stenographer and Typewriter at an annual salary of $750, to take effect November 1, 1904.

The following promotions have been made, each of which will take effect on November 1, 1904:

Miss Sarah E. A. Curran, Stenographer and Typewriter in the Bureau of Street Openings of this Department, from $900 to $1,050 per annum.

Mrs. Elizabeth A. Vibbard, Stenographer and Typewriter in the Main Office, from $900 to $1,050 per annum.

Nathan Goldstein, a Junior Clerk in the Bureau of Street Openings, from $480 to $600 per annum.

Henry J. Shields and John A. Leddy, Junior Clerks in the Main Office, from $480 to $600.

Lawrence T. Connolly, an Office Boy in the Bureau of Penalties, and Augustine H. Matthews, an Office Boy in the Bureau for the Collection of Arrears of Personal Taxes, each to the position of Junior Clerk, at $480 per annum.

EXECUTIVE DEPARTMENT.

MAYOR'S OFFICE—BUREAU OF LICENSES,
NEW YORK, October 31, 1904.

Number of licenses issued and amounts received therefor in the week ending Saturday, October 29, 1904.

BOROUGHS OF MANHATTAN AND THE BRONX.

DATE.	NUMBER OF LICENSES.	AMOUNTS.
Monday, Oct. 24, 1904	174	$408 75
Tuesday, " 25, "	160	869 25
Wednesday, " 26, "	133	270 00
Thursday, " 27, "	49	117 25
Friday, " 28, "	158	297 00
Saturday, " 29, "	66	116 50
Total	740	$2,078 75

BOROUGH OF BROOKLYN.

Monday, Oct. 24, 1904	48	$642 50
Tuesday, " 25, "	44	113 00
Wednesday, " 26, "	58	210 00
Thursday, " 27, "	29	92 50
Friday, " 28, "	49	182 50
Saturday, " 29, "	13	86 50
Total	241	$1,327 00

BOROUGH OF QUEENS.

Monday, Oct. 24, 1904	3	$8 50
Tuesday, " 25, "	..	.....
Wednesday, " 26, "	6	12 00
Thursday, " 27, "	..	.....
Friday, " 28, "	20	43 00
Saturday, " 29, "	..	.....
Total	29	$63 50

BOROUGH OF RICHMOND.

Monday, Oct. 24, 1904	2	$8 00
Tuesday, " 25, "	1	4 00
Wednesday, " 26, "	2	10 00
Thursday, " 27, "	..	.....
Friday, " 28, "	..	.....
Saturday, " 29, "	..	.....
Total	5	$22 00

JOHN P. CORRIGAN,
Chief of Bureau of Licenses.

OFFICIAL DIRECTORY.

CITY OFFICERS.

STATEMENT OF THE HOURS DURING which the Public Offices in the City are open for business, and at which the Courts regularly open and adjourn, as well as the places where such offices are kept and such Courts are held, together with the heads of Departments and Courts:

EXECUTIVE DEPARTMENT.

Mayor's Office.

No. 5 City Hall, 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.
Telephone, 8020 Cortlandt.
GEORGE B. McCLELLAN, Mayor.
John H. O'Brien, Secretary.
Thomas Hassett, Assistant Secretary.

Bureau of Licenses.

9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.
Telephone, 8020 Cortlandt.
John P Corrigan, Chief of Bureau.
Principal Office, Room 1, City Hall; Gaetano D'Amato, Deputy Chief, Boroughs of Manhattan and The Bronx.
Branch Office, Room 12, Borough Hall, Brooklyn; Daniel J. Griffin, Deputy Chief, Borough of Brooklyn.
Branch Office, Richmond Building, New Brighton, S. I.; William R. Woelfle, Financial Clerk, Borough of Richmond.
Branch Office, Hackett Building, Long Island City; Charles H. Smith, Financial Clerk, Borough of Queens.

THE CITY RECORD OFFICE.

Bureau of Printing, Stationery and Blank Books.

Supervisor's Office, Park Row Building, No. 21 Park Row, Entrance Room 803, 9 A. M. to 4 P. M. Saturdays, 9 A. M. to 12 M.
Telephone, 1505 and 1506 Cortlandt. Supply Room, No. 2 City Hall.
Patrick J. Tracy, Supervisor; Henry McMillen, Deputy Supervisor.

CITY CLERK AND CLERK OF THE BOARD OF ALDERMEN.

City Hall, Rooms 11 12, 10 A. M. to 4 P. M.; Saturdays, 10 A. M. to 12 M.
Telephone, 7560 Cortlandt.
P. J. Scully, City Clerk and Clerk of the Board of Aldermen.
Thomas Murphy, First Deputy City Clerk.
Michael F. Blake, Chief Clerk of the Board of Aldermen.
Joseph V. Scully, Deputy City Clerk, Borough of Brooklyn.
Thomas J. McCabe, Deputy City Clerk, Borough of The Bronx.
William R. Zimmerman, Deputy City Clerk, Borough of Queens.
Joseph F. O'Grady, Deputy City Clerk, Borough of Richmond.

BOARD OF ALDERMEN.

No. 11 City Hall, 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.
Telephone, 7560 Cortlandt
Charles V Fornes, President.
P. J. Scully, City Clerk.

DEPARTMENT OF FINANCE.

Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.; Saturdays, 9 A. M to 12 noon.
Edward M. Grout, Comptroller.
N. Taylor Phillips and James W. Stevenson, Deputy Comptrollers.
Hubert L. Smith, Assistant Deputy Comptroller.
Oliver E. Stanton, Secretary to Comptroller.

Main Division.

H. J. Storrs, Chief Clerk, Room 11.

Bookkeeping and Awards Division.

Joseph Haag, Chief Accountant and Bookkeeper.

Stock and Bond Division.

James J. Sullivan, Chief Stock and Bond Clerk, Room 39.

Bureau of Audit—Main Division.

William McKinny, Chief Auditor of Accounts, Room 27.

Law and Adjustment Division.

James F. McKinney, Auditor of Accounts, Room 183.

Investigating Division.

Charles S. Hervey, Auditor of Accounts, Room 178.

Charitable Institutions Division.

Daniel C. Potter, Chief Examiner of Accounts of Institutions, Room 40.

Bureau of the City Paymaster.

No. 83 Chambers street and No. 65 Reade street.
John H. Timmerman, City Paymaster.

Bureau of Engineering.

Stewart Building, Chambers street and Broadway
Eugene E. McLean, Chief Engineer, Room 55.

Real Estate Bureau.

Mortimer J. Brown, Appraiser of Real Estate, Room 157.

Bureau for the Collection of Taxes.

Borough of Manhattan—Stewart Building, Room O.
David E. Austen, Receiver of Taxes.
John J. McDonough, Deputy Receiver of Taxes.
Borough of The Bronx—Municipal Building, Third and Tremont avenues.
John B. Underhill, Deputy Receiver of Taxes.
Borough of Brooklyn—Municipal Building, Rooms 2-8.
Jacob S. Van Wyck, Deputy Receiver of Taxes.
Borough of Queens—Hackett Building, Jackson avenue and Fifth street, Long Island City.
Frederick W. Bleckwenn, Deputy Receiver of Taxes.
Borough of Richmond—Bay and Sand streets, Stapleton.
John DeMorgan, Deputy Receiver of Taxes.

Bureau for the Collection of Assessments and Arrears.

Borough of Manhattan—Stewart Building, Room 81.
Edward A. Slattery, Collector of Assessments and Arrears.
John B. Adger Mullally, Deputy Collector of Assessments and Arrears.
Borough of The Bronx—Municipal Building, Rooms 1-3.
James J. Donovan, Jr., Deputy Collector of Assessments and Arrears.
Borough of Brooklyn—Municipal Building.
John H. McCooey, Deputy Collector of Assessments and Arrears
Borough of Queens—Hackett Building, Jackson avenue and Fifth street Long Island City
Patrick E. Leahy, Deputy Collector of Assessments and Arrears.
Borough of Richmond—Bay and Sand streets, Stapleton.
George Brand, Deputy Collector of Assessments and Arrears.

Bureau for the Collection of City Revenue and of Markets.

Stewart Building, Chambers street and Broadway, Room 139.
Thomas F. Byrnes, Collector of City Revenue and Superintendent of Markets.
James H. Baldwin, Deputy Collector of City Revenue.
David O'Brien, Deputy Superintendent of Markets.

Bureau of the City Chamberlain.

Stewart Building, Chambers street and Broadway, Rooms 6 to 67; and Kings County Court-house, Room 14, Borough of Brooklyn.
Patrick Keenan City Chamberlain.
John H. Campbell, Deputy Chamberlain.

COMMISSIONER OF LICENSES.

Office, No. 277 Broadway.
Frederick L. C. Kearing, Commissioner.

LAW DEPARTMENT.

Office of Corporation Counsel.

Staats-Zeitung Building, 2d, 3d and 4th floors, 9 A. M. to 5 P. M.; Saturdays 9 A. M. to 12 M.
Telephone, 5366 Cortlandt.
John J. Delany, Corporation Counsel.
Assistants—Theodore Connoly Charles D. Olendorf, George L. Sterling Charles L. Guy, William P. Burr, Edwin J. Freedman, John L. O'Brien, Terence Farley. James T. Malone, James Lindsay Gordon, William J. O'Sullivan, Arthur C. Butts Charles N. Harris, George S. Coleman, Charles A. O'Niel, William Beers Crowell, Arthur Sweeny, John F. O'Brien, John C. Breckenridge, Louis H. Hahlo, Andrew T. Campbell Jr. Franklin Chase Hoyt E. Crosby Kindleberger, Montgomery Hare. Thomas F Noonan, Kenyon Fo tesque, Charles McIntyre.
Secretary to the Corporation Counsel—William F Clark.
Borough of Brooklyn Branch Office—James D. Bell, Assistant in charge.
Borough of Queens Branch Office—Denis O'Leary, Assistant in charge.
Borough of The Bronx Branch Office—Richard H. Mitchell, Assistant in charge.
Borough of Richmond Branch Office—John Widdecombe, Assistant in charge.
Andrew T. Campbell, Chief Clerk.

Bureau of Street Openings.

Nos. 90 and 92 West Broadway, 9 A. M. to 5 P. M. Saturdays, 9 A. M. to 12 M.
John P. Dunn, Assistant in charge.

Bureau for the Recovery of Penalties.

Nos. 119 and 121 Nassau street, 9 A. M. to 5 P. M. Saturdays, 9 A. M. to 12 M.
Herman Stiefel, Assistant in charge.

Bureau for the Collection of Arrears of Personal Taxes.

No. 280 Broadway (Stewart Building). Office hours for the Public, 10 A. M. to 2 P. M.; Saturdays, 10 A. M. to 12 M.
Henry Steinert, Assistant in charge.

Tenement House Bureau and Bureau of Buildings.

No. 44 East Twenty-third street, 9 A. M. to 5 P. M.; Saturdays, 9 A. M. to 12 M.
John P. O'Brien, Assistant in charge.

COMMISSIONERS OF ACCOUNTS.

Rooms 114 and 115, Stewart Building, 9 A. M. to 4 P. M. Telephone, 4315 Franklin.
John C. Hertle, William Harman Black, Commissioners.

COMMISSIONERS OF SINKING FUND.

George B. McClellan, Mayor, Chairman; Edward M. Grout Comptroller; Patrick Keenan Chamberlain; Charles V. Fornes, President of the Board of Aldermen, and John T. McCall, Chairman, Finance Committee, Board of Aldermen Members. N. Taylor Phillips, Deputy Comptroller, Secretary.
Office of Secretary, Room No. 12, Stewart Building.

BOARD OF ESTIMATE AND APPORTIONMENT.

Telephone, Finance Department, 2070 Franklin.
Telephone, Public Improvements, 3154 Franklin.
The Mayor, Chairman; the Comptroller, President of the Board of Aldermen, President of the Borough of Manhattan, President of the Borough of Brooklyn, President of the Borough of The Bronx, President of the Borough of Queens, President of the Borough of Richmond.
James W. Stevenson, Deputy Comptroller, Secretary, Finance Department, No. 280 Broadway; John H. Mooney, Assistant Secretary, Public Improvements, No. 277 Broadway; Charles V. Adee, Clerk of the Board, Finance Department, No. 280 Broadway.

AQUEDUCT COMMISSIONERS.

Room 207 Stewart Building, 5th floor, 9 A. M. to 4 P. M. Telephone, 1942 Franklin.
The Mayor, the Comptroller, *ex officio*; Commissioners William H. Ten Eyck (President), John J.

Ryan, William E. Curtis and John P. Windolph; Harry W. Walker, Secretary; Jonas Waldo Smith, Chief Engineer.

POLICE DEPARTMENT.

Central Office.

No. 300 Mulberry street, 9 A. M. to 4 P. M.
Telephone, 3100 Spring.
William McAdoo, Commissioner.
Thomas F. McAvoy, First Deputy Commissioner.
Thomas F. Farrell, Second Deputy Commissioner.
Harris Lindsley, Third Deputy Commissioner.

BOARD OF ARMORY COMMISSIONERS.

The Mayor, George B. McClellan, Chairman; the President of the Department of Taxes and Assessments Frank A. O'Donnel, Vice-Chairman; the President of the Board of Aldermen, Charles V. Fornes; Brigadier-General James McLeer and Brigadier-General George Moore Smith, Commissioners.

Eugene A. Fornes, Secretary, and Frank J. Bell, Acting Secretary, Stewart Building, No. 280 Broadway.

Office hours, 9 A.M. to 4 P.M.; Saturdays, 9 A. M. to 12 M.

BOARD OF ELECTIONS.

Headquarters, General Office, No. 107 West Forty-first street.

Commissioners—John R. Voorhis (President), Charles B. Page (Secretary), John Maguire, Rudolph C. Fuller.

A. C. Allen, Chief Clerk of the Board.

BOROUGH OFFICES.

Manhattan.

No. 112 West Forty-second street.
William C. Baxter, Chief Clerk.

The Bronx.

One Hundred and and Thirty-eighth street and Mott avenue (Solongen Building).
Cornelius A. Bunner Chief Clerk.

Brooklyn.

No. 42 Court street.
George Russell, Chief Clerk.

Queens.

No. 51 Jackson avenue, Long Island City.
Carl Voegel, Chief Clerk.

Richmond.

Staten Island Savings Bank Building, Stapleton, S. I.
Alexander M. Ross, Chief Clerk.

All offices open from 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.

DEPARTMENT OF BRIDGES.

Nos. 13-21 Park row.
George F. Best, Commissioner.
F. E. V. Dunn, Secretary.
Office hours, 9 A. M. to 4 P. M.
Saturdays, 9 A. M. to 12 M.
Telephone, 6080 Cortlandt.

DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY.

Nos 13 to 21 Park row, 9 A. M. to 4 P. M.
Telephones Manhattan, 256 Cortlandt; Brooklyn, 3980 Main; Queens, 439 Greenpoint; Richmond, 94 Tompkinsville; Bronx, 62 Tremont.
John T. Oakley, Commissioner.
Frank J. Goodwin, Deputy Commissioner.
Nicholas S Hill, Jr., Chief Engineer.
George W. Birdsall, Consulting Hydraulic Engineer
George F Sever, Consulting Electrical Engineer.
Charles F. Lacombe, Engineer of Surface Construction.
Joseph W. Savage, Water Registrar, Manhattan.
William M. Blake, Private Secretary.
Joseph F Prendergast Secretary to the Department.
Thomas R. Farrell, Deputy Commissioner, Borough of Brooklyn, Municipal Building, Brooklyn.
William R. McGuire Water Registrar, Brooklyn.
Thomas H. O'Neil, Deputy Commissioner, Borough of The Bronx, Crotona Park Building, One Hundred and Seventy-seventh street and Third avenue.
Thomas M. Lynch, Water Registrar, The Bronx.
George H Creed, Deputy Commissioner, Borough of Queens, Hackett Building, Long Island City.
Edward I. Miller, Deputy Commissioner, Borough of Richmond, Richmond Building, New Brighton, S. I.

FIRE DEPARTMENT.

Office hours for all, except where otherwise noted, from 9 A. M. to 4 P. M.; Saturdays, 12 M.

Headquarters.

Nos. 157 and 159 East Sixty-seventh street.
Telephone, 2230 Plaza, Manhattan; 2356 Main, Brooklyn.
Nicholas J. Hayes, Fire Commissioner.
Thomas W. Churchill, Deputy Commissioner.
William A. Doyle, Deputy Commissioner, Boroughs of Brooklyn and Queens.
Alfred M. Downes, Secretary; Albert F. Volgenau, Secretary to the Commissioner; George F. Dobson, Jr., Secretary to the Deputy Commissioner.
Edward F. Croker, Chief of Department and in charge of Fire Alarm Telegraph.
Thomas Lally, Deputy Chief of Department in charge, Boroughs of Brooklyn and Queens.
George E. Murray, Inspector of Combustibles.
William A. Hervey, Assistant Inspector of Combustibles, Boroughs of Brooklyn and Queens, Nos. 365 and 367 Jay street, Brooklyn.
Peter Seery, Fire Marshal, Boroughs of Manhattan, The Bronx and Richmond.
William L. Beers, Assistant Fire Marshal in charge, Boroughs of Brooklyn and Queens.
William T. Beggin, Chief of Battalion in charge Bureau of Violations and Auxiliary Fire Appliances, Boroughs of Manhattan and The Bronx.
Michael Quinn, Foreman in charge Bureau of Violations and Auxiliary Fire Appliances, Boroughs of Brooklyn and Queens.
Central Office open at all hours.
Committee to examine persons who handle explosives meets Thursday of each week at 2 o'clock P. M.

MUNICIPAL EXPLOSIVES COMMISSION.

Nos. 157 and 159 East Sixty-seventh street, Headquarters Fire Department.
Fire Commissioner Nicholas J. Hayes, Chairman; William Montgomery, John Sherry, Abraham Piser, Dr Charles F. McKenna.
Franz S. Wolf, Secretary.
Stated meetings every Thursday at 2 P. M.

DEPARTMENT OF STREET CLEANING.

Nos. 13 to 21 Park Row, 9 A. M. to 4 P. M.
Telephone, 3863 Cortlandt.
John McGaw Woodbury, Commissioner.
F. M. Gibson, Deputy Commissioner.
John J. O'Brien, Chief Clerk.

DEPARTMENT OF CORRECTION.

Central Office.

No. 148 East Twentieth street. Office hours from 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.
Telephone, 1047 Gramercy.
Francis J. Lantry, Commissioner.
George W. Meyer, Jr, Deputy Commissioner.
John B. Fitzgerald, Secretary.

DEPARTMENT OF PUBLIC CHARITIES.

Central Office.

Foot of East Twenty-sixth street, 9 A. M to 4 P. M.
Telephone, 3350 Madison Square.

James H. Tully, Commissioner.
James E. Dougherty, First Deputy Commissioner.
James J. McInerney, Second Deputy Commissioner for Brooklyn and Queens, Nos. 126 and 128 Livingston street, Brooklyn.

Plans and Specifications, Contracts, Proposals and Estimates for Work and Materials for Building Repairs and Supplies, Bills and Accounts, 9 A. M. to 4 P. M.; Saturdays, 12 M.

Bureau of Dependent Adults, foot of East Twenty-sixth street Office hours, 8.30 A. M. to 5 P. M.

Bureau of Dependent Children, No. 66 Third avenue Office hours, 8.30 A. M to 5 P. M.

TENEMENT HOUSE DEPARTMENT.

Manhattan Office, No. 61 Irving place, southwest corner Eighteenth street.
Telephone, 5321 Eighteenth.
Brooklyn Office, Temple Bar Building, No. 44 Court street.
Bronx Office to be established.
Thomas C. T Crain, Commissioner.
John F. Skelly, First Deputy Tenement House Commissioner
William Brennan, Second Deputy Tenement House Commissioner.

DEPARTMENT OF DOCKS AND FERRIES.

Pier "A," N. R., Battery place.
Telephone, 1681 Broad.
Maurice Featherson, Commissioner.
Joseph A. Bill, Deputy Commissioner.
Charles J. Collins Secretary.
Office hours, 9 A.M. to 4 P.M.; Saturdays, 12 M.

BELLEVUE AND ALLIED HOSPITALS.

Telephone, 2730 Madison Square.
Board of Trustees—Dr. John W. Brannan, Theodore E. Tack, Arden M. Robbins, Myles Tierney, Samuel Sachs, James K. Paulding, Marcus Stine, James H Tully.

DEPARTMENT OF HEALTH.

Southwest corner of Fifty-fifth street and Sixth avenue, Borough of Manhattan, 9 A. M. to 4 P. M.
Burial Permit and Contagious Disease Offices always open.
Thomas Darlington, M. D., Commissioner of Health and President.
Telephone, 1204 Columbus.
Eugene W. Scheffer, Secretary.
Charles F. Roberts, M. D., Sanitary Superintendent.
William H. Guilfoy, M. D., Registrar of Records.
Walter Bensel, M. D., Assistant Sanitary Superintendent, Borough of Manhattan. Gerald Sheil, M. D., Assistant Sanitary Superintendent, Borough of The Bronx, No. 1237 Franklin avenue.
Robert H. Herkimer, M. D., Assistant Sanitary Superintendent, Borough of Brooklyn, Nos. 38 and 40 Clinton street.
John P. Moore, M. D., Assistant Sanitary Superintendent, Borough of Queens, Nos. 372 and 374 Fulton street, Jamaica.
John T. Sprague, M. D., Assistant Sanitary Superintendent, Borough of Richmond, Nos. 54 and 56 Water street, Stapleton, Staten Island.

DEPARTMENT OF PARKS.

John J. Pallas, Commissioner of Parks for the Boroughs of Manhattan and Richmond and President of the Park Board.
Willis Holly, Secretary, Park Board.
Offices, Arsenal, Central Park.
Michael J. Kennedy, Commissioner of Parks for the Boroughs of Brooklyn and Queens.
Offices, Litchfield Mansion, Prospect Park, Brooklyn.
John J. Brady, Commissioner of Parks for the Borough of The Bronx.
Offices, Zbrowski Mansion, Claremont Park.
Office hours, 9 A. M. to 4 P. M.; Saturdays, 12 M.

DEPARTMENT OF TAXES AND ASSESSMENTS.

Stewart Building, No. 280 Broadway. Office hours, 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.
Commissioners—Frank A. O'Donnel, President; James B. Bouck, Edward Todd, Samuel Strasbourger, Nicholas Muller, Frank Raymond.

MUNICIPAL CIVIL SERVICE COMMISSION.

No. 61 Elm street, 9 A. M. to 4 P. M.
Bird S. Coler, President; R. Ross Appleton, Alfred J. Talley.
Henry Berlinger, Secretary

BOARD OF ASSESSORS.

Office, No. 320 Broadway, 9 A. M. to 4 P. M.; Saturdays, 12 M.
Robert Muh, President.
Antonio Zucca.
Charles A. O'Malley.
W. H. Jasper, Secretary.

DEPARTMENT OF EDUCATION.

BOARD OF EDUCATION.

Park avenue and Fifty-ninth street, Borough of Manhattan, 9 A. M. to 5 P. M. (in the month of August 9 A M to 4 P. M.); Saturdays, 9 A. M. to 12 M.
Telephone, 1280 Plaza.

Richard B. Adams Richard B. Aldcroft, Jr.; Frank L. Babbott, Grosvenor H. Backus Nicholas J. Barrett, John J. Barry. M. Dwight Collier, Francis P. Cunnion, Samuel M. Dix, Samuel B. Donnelly, A Leo Everett, Frank Harvey Field, Joseph Nicola Francolini, Algernon S Frissell, John Greene, George D. Hamlin, M. D.; William Harkness, Robert L. Harrison, Louis Haupt, M D.; Thomas J. Higgins, James J. Higginson, Charles H Ingalls, Frederic W Jackson, Nathan S. Jonas, John C Kelley John P. Kelly, Adolph Kendl, William Lummis, Alrick H. Man, Frederick W. Marks, Patrick F. McGowan, Edward D. O'Brien, Frank H. Partridge, George E. Payne, James A. Renwick, Louis A. Rodenstein, M D.; George W. Schaedle Abraham Stern, Henry N. Tifft, George A. Vandenhoff, Felix M. Warburg James Weir, Jr.; Frank D. Wilsey, George W. Wingate, M. Samuel Stern.

——— President.
Frank L. Babbott, Vice-President.
A. Emerson Palmer, Secretary.
Fred H Johnson, Assistant Secretary.
C. B. J. Snyder, Superintendent of School Buildings.
Patrick Jones, Superintendent of School Supplies.
Henry R M. Cook, Auditor.
Henry M. Leipziger Supervisor of Lectures.
Claude G Leland, Superintendent of Libraries.
Henry M. Devoe, Supervisor of Janitors.

Board of Superintendents,

William H. Maxwell, City Superintendent of Schools, and George S. Davis, Andrew W. Edson, Algernon S. Higgins, Albert P. Marble Clarence E. Meleney, Thomas S. O'Brien, Edward L. Stevens, John H. Walsh, Associate City Superintendents.

District Superintendents.

Darwin L. Bardwell, William A. Campbell, John J. Chickering, John Dwyer, James M. Edsall, Matthew J. Elgas, Edward D. Farrell, Cornelius E. Franklin, John Griffin, M. D.; John H. Haaren John L. N. Hunt, Henry W. Jameson, James Lee, Charles W. Lyon, Jr.; James J. McCabe, Arthur McMullin, Julia Richman, Alfred T. Schauffler, Edward B. Shallow, Edgar Dubs Shimer, Seth T. Stewart, Edward W. Stitt, Grace C. Strachan, Gustave Straubenmuller, Joseph S. Taylor, Evangeline E. Whitney.

Board of Examiners.

William H. Maxwell, City Superintendent of Schools, and James C. Byrnes, Walter L. Hervey, Jerome A. O'Connell, George J Smith.

ART COMMISSION.

City Hall, Room 21.
Telephone call, 1197 Cortlandt.
John DeWitt Warner, President; J. Carroll Beckwith, Vice-President; A. Augustus Healy, President of Brooklyn Institute of Arts and Sciences, Secretary; George B. McClellan, Mayor of The City of New York; J. Pierpont Morgan, Acting President of Metropolitan Museum of Art; John Bigelow, President of New York Public Library; A. Thimister Proctor, Sculptor; Henry Rutgers Marshall, Architect; John D. Crimmins, Loyall Farragut.
Milo R. Maltbie, Assistant Secretary.

THE BOARD OF EXAMINERS OF THE CITY OF NEW YORK.

Rooms 6027 and 6028 Metropolitan Building, No. 1 Madison avenue, Borough of Manhattan. 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 noon.
Telephone, 5810 Gramercy.
William J. Fryer, Chairman; Walter Cook, Warren A. Conover, William C. Smith, Charles G. Smith, Edward F. Croker, Charles Brendon.
Thomas F. Donohue, Clerk.
Board meeting every Tuesday at 3 P. M.

EXAMINING BOARD OF PLUMBERS.

Robert McCabe, President; David Jones, Secretary; Denis Donegon, Treasurer; ex-officio Horace Loomis and P. J. Andrews.

Rooms 14, 15 and 16 Aldrich Building, Nos. 149 and 151 Church street

Office open during business hours every day in the year, except legal holidays. Examinations are held on Monday, Wednesday and Friday after 1 P. M.

BOROUGH OFFICES.

Borough of Manhattan.

Office of the President, Nos. 10, 11 and 12 City Hall, 9 A. M to 4 P. M.; Saturdays, 9 A. M. to 12 M.
John F. Ahearn, President.
Bernard Downing, Secretary.
Isaac A. Hopper, Superintendent of Buildings.
William Dalton, Commissioner of Public Works.
James J. Hagan, Assistant Commissioner of Public Works.
William H. Walker, Superintendent of Public Buildings and Offices.
Matthew F. Donohue, Superintendent of Sewers.
John L. Jordan, Assistant Superintendent of Buildings.
George F. Scannell, Superintendent of Highways.

Borough of The Bronx.

Office of the President, corner Third avenue and One Hundred and Seventy-seventh street, 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.
Louis F. Haffen, President.
Henry A. Gumbleton, Secretary
Patrick J. Reville, Superintendent of Buildings.
Henry Bruckner, Commissioner of Public Works.

Borough of Brooklyn.

President's Office, No. 11 Borough Hall, 9 A. M. to 4.30 P. M.; Saturdays, 9 A. M. to 12 M.
Martin W. Littleton, President.
John A. Heffernan, Secretary.
Denis A. Judge, Private Secretary.
John C. Brackenridge, Commissioner of Public Works.
James S. Regan, Assistant Commissioner of Public Works.
Peter J. Collins, Superintendent of Buildings.
George W. Tillson, Chief Engineer-in-Charge, Bureau of Highways.
Arthur J. O'Keefe, Superintendent of the Bureau of Sewers.
Charles C. Wise, Superintendent of the Bureau of Public Buildings and Offices.

Borough of Queens.

President's Office, Borough Hall, Jackson avenue and Fifth street, Long Island City.
Joseph Cassidy, President.
George S. Jervis, Secretary to the President.
Joseph Bermel, Commissioner of Public Works.
Samuel Grennon Superintendent of Highways.
Office, Hackett Building, Long Island City.
Joseph P. Powers, Superintendent of Buildings.
Philip T. Cronin, Superintendent of Public Buildings and Offices Jamaica, L. I.
Matthew J. Goldner, Superintendent of Sewers.
James F. O'Brien, Superintendent of Street Cleaning.
Robert R. Crowell, Assistant Engineer-in-Charge, Topographical Bureau.
Office, Long Island City, 9 A. M. to 4 P. M.; Saturdays, from 9 A. M. until 12 M.

Borough of Richmond.

President's Office, New Brighton, Staten Island.
George Cromwell, President
Maybury Fleming, Secretary to the President.
Louis Lincoln Tribus, Commissioner of Public Works.
John Seaton, Superintendent of Buildings.
John Timlin, Jr., Superintendent of Public Buildings and Offices.
H E. Buel, Superintendent of Highways.
Richard T Fox, Superintendent of Street Cleaning.
Ernest H. Seehusen, Superintendent of Sewers.
Office of the President, First National Bank Building, New Brighton, 9 A. M. to 4 P. M.; Saturdays, 9 A M. to 12 M.

CORONERS.

Borough of Manhattan—Office, New Criminal Court Building. *Open at all times of day and night.*
Gustav Scholer, Solomon Goldenkranz, Nicholas T Brown, Moses J Jackson.
Chief Clerk, Stephen N. Simonson.
Borough of The Bronx—Corner of Third avenue and One Hundred and Seventy-seventh street. Telephone, 333 Tremont.
Walter H. Henning, Chief Clerk.
William O'Gorman, Jr.; Joseph I. Berry.
Borough of Brooklyn—Office, Room 11, Borough Hall Telephone, 4004 Main and 4005 Main.
Philip T Williams, Michael J Flaherty.
James L. Gernon, Chief Clerk.
Open at all hours of day and night, except between the hours of 12 M. and 5 P. M. on Sundays and holidays.
Borough of Queens—Office, Borough Hall, Fulton street, Jamaica, L. I.
Samuel D. Nutt. Leonard Ruoff, Jr.
Martin Mager Jr, Chief Clerk.
Office hours from 9 A. M. to 4 P. M.
Borough of Richmond—No. 174 Bay street, Stapleton. Open for the transaction of business all hours of the day and night.
George F. Schafer.

NEW YORK COUNTY OFFICES.

SURROGATE.

New County Court-house. Court open from 9 A. M to 4 P M., except Saturday, when it closes at 12 M. During the months of July and August the hours are from 9 A. M. to 2 P M.
Frank T. Fitzgerald. Abner C. Thomas, Surrogates; William V. Leary, Chief Clerk.

SHERIFF.

Stewart Building, 9 A. M. to 4 P. M.
Mitchell L. Erlanger, Sheriff; Julius Harburger, Under Sheriff.

COUNTY JAIL.

No. 70 Ludlow street.
Mitchel L. Erlanger, Sheriff.
Julius Harburger, Under Sheriff.
Thomas H. Sullivan, Warden.

DISTRICT ATTORNEY.

Building for Criminal Courts, Franklin and Centre streets.
Office hours from 9 A. M. to 5 P. M.; Saturdays, 9 A. M. to 12 M.
William Travers Jerome, District Attorney.
John A. Henneberry, Chief Clerk.

REGISTER.

No. 116 Nassau street. Office hours from 9 A. M. to 4 P M.; Saturdays, 9 A. M. to 12 M. During the months of July and August the hours are from 9 A. M. to 2 P. M.
John H. J. Ronner, Register; Henry H. Sherman, Deputy Register.

COUNTY CLERK.

Nos. 8, 9, 10 and 11 New County Court-house Office hours from 9 A. M. to 2 P. M.
Thomas L. Hamilton, County Clerk.
Henry Birrell Deputy.
Patrick H. Dunn, Secretary.

COMMISSIONER OF JURORS.

Room 127, Stewart Building, Chambers street and Broadway, 9 A. M. to 4 P. M.
Thomas Allison, Commissioner.
Matthew F. Neville Assistant Commissioner.
Frederick P. Simpson, Assistant Commissioner.
Frederick O'Byrne, Secretary.

PUBLIC ADMINISTRATOR.

No. 119 Nassau street, 9 A. M. to 4 P. M.
William M. Hoes, Public Administrator.

KINGS COUNTY OFFICES.

COUNTY COURT, KINGS COUNTY.

County Court-house, Brooklyn, Rooms 10, 19, 22 and 23. Court opens at 10 A. M. daily, and sits until business is completed Part I., Room No. 23; Part II., Room No. 10, Court-house. Clerk's Office, Rooms 19 and 22, open daily from 9 A. M. to 4 P. M.; Saturdays, 12 M.
Joseph Aspinall and Frederick E. Crane, County Judges.
Charles S. Devoy, Chief Clerk.

SURROGATE.

Hall of Records, Brooklyn, N. Y.
James C. Church, Surrogate.
William P. Pickett, Clerk of the Surrogate's Court.
Court opens at 10 A. M. Office hours, 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.

SHERIFF.

County Court-house, Brooklyn, N. Y.
9 A. M. to 4 P. M.; Saturdays, 12 M.
Henry Hesterberg, Sheriff.

COUNTY JAIL.

Raymond street, between Willoughby street and DeKalb avenue, Brooklyn, N. Y.
Henry Hesterberg Sheriff.
William McLaughlin, Warden.

DISTRICT ATTORNEY.

Office, County Court-house, Borough of Brooklyn. Hours, 9 A. M. to 5 P. M.
John F. Clarke, District Attorney.

REGISTER.

Hall of Records. Office hours, 9 A. M. to 4 P. M., excepting months of July and August; then from 9 A. M. to 2 P.M., provided for by statute.
Matthew E. Dooley, Register.
Patrick H. Quinn, Deputy Register.
Augustus W. Maul, Assistant Deputy Register.
John B. Shanahan, Counsel.
John H. McArdle, Secretary.

COUNTY CLERK.

Hall of Records, Brooklyn, 9 A. M to 4 P.M.
Edward Kaufmann, County Clerk.
Dennis Winter, Deputy County Clerk.
Joseph P. Donnelly, Assistant Deputy County Clerk.
Telephone call, 1151 Main.

COMMISSIONER OF JURORS.

5 Court-house.
Jacob Brenner, Commissioner.
Frank J. Gardner, Deputy Commissioner.
Albert B. Waldron, Secretary.
Office hours from 9 A. M. to 4 P. M.; Saturdays from A. M. to 12 M.

COMMISSIONER OF RECORDS.

Rooms, 7, 9 10 and 11, Hall of Records.
Office hours, 9 A. M. to 4 P. M., excepting months of July and August, then 9 A. M. to 2 P. M.; Saturdays, 9 A. M to 12 M.
John K. Neal, Commissioner.
D. H. Ralston, Deputy Commissioner.
Thomas D. Mosscrop, Superintendent.
William J. Beattie, Assistant Superintendent.

PUBLIC ADMINISTRATOR.

No. 189 Montague street Brooklyn, 9 A. M. to 4 P. M., except Saturdays in June, July and August, 9 A. M. to 12 M.
William B. Davenport, Public Administrator.

QUEENS COUNTY OFFICES.

SURROGATE.

Daniel Noble, Surrogate.
Office at Jamaica.
Except on Sundays, holidays and half holidays the office is open between March 31 and October 1 from 8 A. M. to 5 P. M.; on Saturdays from 8 A. M. to 12 M.; between September 30 and April 1, from 9 A. M to 5 P. M.; on Saturdays from 9 A. M. to 1 M
Surrogate's Court sits on Thursday and Friday of each week except during the month of August, when no court is held. Calendar called at 10 A. M.

COUNTY COURT.

County Court-house Long Island City.
County Court opens at 10 A. M. and adjourns at 5 P. M.
County Judge's office always open at 336 Fulton street, Jamaica, N. Y.
Burt J. Humphrey, County Judge.

SHERIFF.

County Court-house, Long Island City, 9 A. M. to 4 P. M.; Saturday from 9 A. M. to 12 M.
Joseph Meyerrose, Sheriff.
Henry W. Sharkey, Under Sheriff.

DISTRICT ATTORNEY.

Office, Queens County Court-house, Long Island City, 9 A. M. to 5 P. M.
George A. Gregg, District Attorney.

COUNTY CLERK.

Jamaica, N. Y.; Fourth Ward Borough of Queens.
Office hours, April 1 to October 1, 8 A. M to 5 P. M.; October 1 to April 1, 9 A. M. to 5 P. M.; Saturdays, to 12 M.
County and Supreme Court held at the Queens County Court-house, Long Island City. Court opens at 9 30 A. M., to adjourn 5 P. M.
David L. Von Nostrand, County Clerk.
Charles Downing, Deputy County Clerk.

COMMISSIONER OF JURORS.

Office hours, 9 A. M. to 4 P. M.; Saturdays, 9 A. M. to 12 M.
Edward J. Knauer, Commissioner.
H. Homer Moore, Assistant Commissioner.

PUBLIC ADMINISTRATOR.

No. 103 Third street, Long Island City, 9 A. M. to 5 P. M
Charles A. Wadley, Public Administrator.

RICHMOND COUNTY OFFICES.

COUNTY JUDGE AND SURROGATE.

Terms of Court, Richmond County, 1904.
County Courts—Stephen D. Stephens, County Judge.
First Monday of June, Grand and Trial Jury;
First Monday of December, Grand and Trial Jury;
Fourth Wednesday of January, without a Jury;
Fourth Wednesday of February, without a Jury;
Fourth Wednesday of March, without a Jury;
Fourth Wednesday of April, without a Jury;
Fourth Wednesday of July, without a Jury;
Fourth Wednesday of September, without a Jury;
Fourth Wednesday of October, without a Jury;
—All at the Court-house at Richmond.
Surrogate's Court—Stephen D. Stephens, Surrogate.
Mondays, at the First National Bank Building, St. George at 10.30 o'clock A. M.
Tuesdays, at the First National Bank Building, St. George, at 10.30 o'clock A. M
Wednesdays, at the Surrogate's Office, Richmond, at 10.30 o'clock A. M.

DISTRICT ATTORNEY.

Port Richmond, S. I.
Office hours from 9 A. M. to 12 M., and from 1 P. M. to 5 P. M.
Edward S. Rawson, District Attorney.

COUNTY CLERK.

County Office Building, Richmond, S. I., 9 A. M. to 4 P. M.
C. L. Bostwick, County Clerk.
County Court-house, Richmond, S. I., 9 A. M. to 4 P. M.

SHERIFF.

County Court-house Richmond, S. I.
Office hours, 9 A.M. to 4 P. M.
Charles J McCo mack Sheriff.
Thomas A. Banning, Under Sheriff.

COMMISSIONER OF JURORS.

Village Hall, Stapleton
Charles J Kullman, Commissioner.
John J. McCaughey, Assistant Commissioner.
Office open from 9 A. M. until 4 P. M.; Saturdays from 9 A. M. to 12 M.

THE COURTS.

APPELLATE DIVISION OF THE SUPREME COURT.

FIRST JUDICIAL DEPARTMENT.

Court-house, Madison avenue, corner Twenty-fifth street. Court opens at 1 P. M.
Charles H. Van Brunt, Presiding Justice; Edward Patterson, Morgan J. O'Brien, George L. Ingraham, Chester B McLaughlin, Edward W. Hatch, Frank C. Laughlin, Justices; Alfred Wagstaff, Clerk; William Lamb Deputy Clerk.
Clerk's Office open at 9 A. M.

SUPREME COURT—FIRST DEPARTMENT.

County Court-house, Chambers street. Courts open from 10.30 A. M to 4 P. M.
Special Term, Part I. (motions), Room No. 12.
Special Term, Part II (ex-parte business), Room No. 15.
Special Term. Part III., Room No. 19.
Special Term, Part IV., Room No. 11.
Special Term, Part V., Room No 30.
Special Term, Part VI. (Elevated Railroad cases), Room No. 36.
Trial Term, Part II., Room No. 25
Trial Term, Part III., Room No. 17.
Trial Term, Part IV., Room No. 18.
Trial Term. Part V., Room No 16.
Trial Term, Part VI., Room No. 24.
Trial Term, Part VII., Room No. 23.
Trial Term, Part VIII., Room No 33.
Trial Term, Part IX., Room No. 31.
Trial Term. Part X., Room No. 32.
Trial Term Part XI., Room No. 22.
Trial Term, Part XII., Room No. 34.
Trial Term, Part XIII., and Special Term, VII., Room No. 26
Appellate Term, Room No 31.
Naturalization Bureau Room No. 38, third floor.
Assignment Bureau, room on third floor.
Clerks in attendance from 10 A. M. to 4 P. M.
Clerk's Office, Special Term, Part I. (motions), Room No. 13.
Clerk's Office, Special Term, Part II. (ex-parte business), room southwest corner mezzanine floor.
Clerk's Office, Special Term, Calendar, room southeast corner second floor
Clerk's Office, Trial Term, Calendar, room northeast corner second floor, east.
Clerk's Office, Appellate Term, room southwest corner, third floor.
Trial Term Part I. (criminal business).
Criminal Court-house, Centre street.
Justices—Charles H. Truax Francis M. Scott, Charles F. MacLean, Henry Bischoff, Jr; Leonard A. Giegerich, John J. Freedman, P Henry Dugro, Henry A Gildersleeve, James Fitzgerald, David Leventritt, James A O'Gorman, George C. Barrett, James A. Blanchard, John Proctor Clarke, Samuel Greenbaum, Edward E. McCall, Edward B. Amend, Vernon M. Davis.

SUPREME COURT—SECOND DEPARTMENT.

Kings County Court-house, Borough of Brooklyn, N. Y.
Courts open daily from 10 o'clock A. M. to 5 o'clock P. M. Six jury trial parts. Special Term for Trials. Special Term for Motions
James F. McGee, General Clerk.

CRIMINAL DIVISION—SUPREME COURT.

Building for Criminal Courts, Centre, Elm, White and Franklin streets.
Court opens at 10.30 A. M.
Thomas L. Hamilton, Clerk; Edward R. Carroll, Special Deputy to the Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.

COURT OF GENERAL SESSIONS.

Held in the building for Criminal Courts, Centre, Elm, White and Franklin streets.
Court opens at 10.30 o'clock A. M
Rufus B. Cowing, City Judge; John W. Goff, Recorder; Joseph E Newburger, Martin T. McMahon and Warren W. Foster, Judges of the Court of General Sessions. Edward R. Carroll, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.

CITY COURT OF THE CITY OF NEW YORK.

No. 32 Chambers street, Brownstone Building, City Hall Park, from 10 A. M. to 4 P. M.
General Term, Part I.
Part II.
Part III.
Part IV.
Part V.
Special Term Chambers will be held from 10 A. M. to 4 P. M.
Clerk's Office open from 9 A. M. to 4 P. M.
Edward F. O'Dwyer, Chief Justice; John H. McCarty, Lewis J. Conlan, Theodore F Hascall, Francis B. Delehanty, Samuel Seabury, John Palmieri, Justices. Thomas F. Smith, Clerk.

COURT OF SPECIAL SESSIONS.

Building for Criminal Courts, Centre street, between Franklin and White streets, Borough of Manhattan.
Court opens at 1 A. M.
Justices—First Division—Elzur B. Hirsdale, William E. Wyatt, John B. McKean, Willard H. Olmsted, Joseph M. Deuel, Lorenz Zeller. William M. Fuller, Clerk; Joseph H. Jones, Deputy Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Second Division—Trial Days—No. 171 Atlantic avenue, Brooklyn, Mondays, Wednesdays and Fridays, at 10 o'clock; Town Hall, Jamaica Borough of Queens, Tuesdays, at 10 o'clock; Town Hall, New Brighton, *Borough of Richmond*, Thursdays, at 10 o'clock.
Justices—John Courtney, Howard J. Forker, Patrick Keady, John Fleming, Thomas W. Fitzgerald, Robert J. Wilkin. Joseph L. Kerrigan, Clerk; John J. Dorman, Deputy Clerk.
Clerk's Office, No. 171 Atlantic Avenue, Borough of Brooklyn, open from 9 A. M. to 4 P. M.

CHILDREN'S COURT.

First Division—No. 66 Third avenue, Manhattan; Edmund C Lee, Clerk.
Second Division—No. 102 Court street. Brooklyn. Robert J. Wilkin, Justice. James P. Sinnott, Clerk.

CITY MAGISTRATES' COURT.

Courts open from 9 A. M. to 4 P. M.
City Magistrates—Robert C. Cornell, Leroy B. Crane, Charles A. Flammer, Clarence W. Meade, John M. Mott, Joseph Pool. John B. Mayo, Edward Hogan, Peter P. Barlow, Matthew P. Breen, Seward Baker, Alfred G. Ommen, Charles S. Whitman, Joseph Moss.
Philip Bloch, Secretary.
First District—Criminal Court Building.
Second District—Jefferson Market.
Third District—No. 69 Essex street.
Fourth District—Fifty-seventh street, near Lexington avenue
Fifth District—One Hundred and Twenty first street, southeastern corner of Sylvan place.
Sixth District—One Hundred and Fifty-eighth street, and Third avenue.
Seventh District—Fifty-fourth street, west of Eighth avenue.

SECOND DIVISION.

Borough of Brooklyn.

City Magistrates—Alfred E. Steers, A. V. B. Voorhees Jr., James G. Tighe. Edward J. Dooley, John Naumer, E. G Higgenbotham, Frank E. O'Reilly, Henry J. Furlong
President of Board, James G. Tighe, No. 184½ Bergen street
Secretary to the Board. Lawrence D. Carroll, West Eighth street, Coney Island.
First District—No. 318 Adams street.
Second District—Court and Butler streets.
Third District—Myrtle and Vanderbilt avenues.
Fourth District—Lee avenue and Clymer street.
Fifth District—Manhattan avenue and Powers street.
Sixth District—Gates and Reid avenues.
Seventh District—Grant street (Flatbush).
Eighth District—West Eighth street (Coney Island).

Borough of Queens.

City Magistrates—Matthew J. Smith, Luke J. Connorton. Edmund J. Healy.
First District—Long Island City.
Second District - Flushing.
Third District—Far Rockaway.

Borough of Richmond.

City Magistrates—John Croak, Nathaniel Marsh.
First District—New Brighton, Staten Island.
Second District—Stapleton, Staten Island.

MUNICIPAL COURTS.

Borough of Manhattan.

First District—Third, Fifth and Eighth Wards and all that part of the First Ward lying west of Broadway and Whitehall street, including Governor's Island, Bedloe's Island, Ellis Island and the Oyster Islands. New Court-house, No. 128 Prince street, corner of Wooster street
Daniel E. Finn, Justice. Thomas O'Connell, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Second District—Second, Fourth Sixth and Fourteenth Wards, and all that portion of the First Ward lying south and east of Broadway and Whitehall street. Court-room, corner of Grand and Centre streets.
Herman Bolte, Justice. Francis Mangin, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Court opens daily at 10 A. M., and remains open until daily calendar is disposed of and close of the daily business, *except on Sundays and legal holidays.*

Third District—Ninth and Fifteenth Wards. Court-room, southwest corner Sixth avenue and West Tenth street. Court opens daily (Sundays and legal holidays excepted) from 9 A. M. to 4 P. M.
Wm F. Moore, Justice. Daniel Williams, Clerk.
Fourth District—Tenth and Seventeenth Wards. Court-room, No. 30 First street, corner Second avenue. Clerk's Office open daily from 9 A. M. to 4 P. M. Court opens 10 A. M. daily, and remains open to close of business.
George F. Roesch, Justice. Andrew Lang, Clerk.

Fifth District—The Fifth District embraces the Eleventh Ward and all that portion of the Thirteenth Ward which lies east of the centre line of Norfolk street and north of the centre line of Grand Street and west of the centre line of Pitt street and north of the centre line of Delancey street and northwest of Clinton street to Rivington street, and on the centre line of Rivington street *south to Norfolk street.* Court-room, No. 154 Clinton street.
Benjamin Hoffman, Justice. Thomas Fitzpatrick, Clerk.

Sixth District—Eighteenth and Twenty-first Wards. Court-room, northwest corner Twenty-third street and Second avenue. Court opens at 9 A. M. daily, and continues open until close of business.
Daniel F. Martin, Justice. Abram Bernard, Clerk.

Seventh District—Nineteenth Ward Court-room, No. 151 East Fifty seventh street. Court opens every morning at 9 o'clock (except Sundays and legal holidays,, and continues open to close of business.
Herman Joseph, Justice.

Eighth District—Sixteenth and Twentieth Wards. Court-room, northwest corner of Twenty-third street and Eighth avenue Court opens at 9 A. M and continues open until close of business. Summary proceedings and return causes called at 9.30 A. M. Calendar trial causes, 10 A. M.
Clerk's Office open from 9 A. M. to 4 P. M., and on Saturdays until 12 M.
Trial days and Return days, each Court day.
James W McLaughlin, Justice.
Henry Merzbach, Clerk.

Ninth District—Twelfth Ward, except that portion thereof which lies west of the centre line of Lenox or Sixth avenue, and of the Harlem River, north of the terminus of Lenox avenue. Court room No 170 East One Hundred and Twenty-first street, southeast corner of Sylvan place. Court opens every morning at 9 o'clock except Sundays and legal holidays), and continues open to close of business.
Joseph P. Fallon, Justice. William J. Kennedy, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.

Tenth District—The Tenth District embraces that portion of the Twenty-second Ward south of Seventieth street. Court-room, No. 314 West Fifty-fourth street. Court opens daily (Sundays and legal holidays excepted) from 9 A. M. to 4 P. M.
Thomas E. Murray, Justice. Michael Skelly, Clerk.

Eleventh District—The Eleventh District embraces that portion of the Twelfth Ward which lies north of the centre line of West One Hundred and Tenth street, between Lenox avenue and Seventh avenue; north of the centre line of One Hundred and Twenty-fifth street, between Seventh avenue and Broadway; north of the centre line of One Hundred and Nineteenth street, between Broadway and the North or Hudson river, and west of the centre line of Lenox or Sixth avenue and of the Harlem river; north of the terminus of Lenox or Sixth avenue. Court-room, No. 70 Manhattan street. Clerk's office open daily (Sundays and legal holidays excepted) from 9 A. M. to 4 P. M. Court convenes daily at 9.45 A. M.

Francis J. Worcester, Justice. Heman B. Wilson, Clerk.

Twelfth District—The Twelfth District embraces that portion of the Twenty-second Ward north of Seventieth street, and that portion of the Twelfth Ward which lies north of the centre line of Eighty-*sixth street and west of the centre line of Seventh* avenue and south of the centre line of One Hundred and Twentieth street, between Seventh avenue and Broadway and south of the centre line of One Hundred and Nineteenth street, between Broadway and the North or Hudson river. Court-room, No. 2630 Broadway.
Alfred P. W. Seaman, Justice. James V. Gilloon, Clerk.

Thirteenth District—South side of Delancey street, from East river to Pitt street; east side of Pitt street, Grand street, south side of Grand street to Norfolk street, east side of Norfolk street to Division street, south side of Division street to Catharine street, east side of Catharine street to East river (Clerk's office open daily Sundays and legal holidays excepted) from 9 A. M. to 4 P. M
Leon Sanders, Justice. James J. Devlin, Clerk.
Court-room, No. 200 East Broadway.

BOROUGH OF THE BRONX.

First District—All that part of the Twenty-fourth Ward which was lately annexed to the City and County of New York by chapter 934 of the Laws of 1895, comprising all of the late Town of Westchester and part of the Towns of Eastchester and Pelham, including the Villages of Wakefield and Williamsbridge Court-room, Town Hall, Main street, Westchester Village. Court opens daily (Sundays and legal holidays excepted) from 9 A. M to 4 P. M. Trial of causes are Tuesday and Friday of each week.
William W. Penfield, Justice. Thomas F. Delehanty, Clerk
Office hours from 9 A. M. to 5 P. M.; Saturdays, closing at 12 M.
Second District—Twenty-third and Twenty-fourth Wards, except the territory described in chapter 934 of the Laws of 1895. Court-room, corner Third avenue and One Hundred and Fifty-eighth street. Office hours from 9 A. M. to 4 P. M Court opens at 10 A. M.
John M. Tierney, Justice. Thomas A. Maher, Clerk.

BOROUGH OF BROOKLYN.

First District—Comprising First, Second, Third, Fourth, Fifth, Sixth, Tenth and Twelfth Wards of the Borough of Brooklyn. Court-house, northwest corner State and Court streets.
John J. Walsh Justice. Edward Moran, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Calendar called at 10 A. M.
Second District—Seventh, Ninth, Eleventh, Twentieth, Twenty-first and Twenty-third Wards. Court-*room located at No. 495 Gates avenue, Brooklyn.* Calendar called at 10 o'clock A. M.
Gerard B. Van Wort, Justice. William H. Allen, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Third District—Includes the Thirteenth, Fourteenth, Fifteenth, Sixteenth, Seventeenth, Eighteenth and Nineteenth Wards. Court-house, Nos. 6 and 8 Lee avenue, Brooklyn.
William J. Lynch, Justice. John W. Carpenter, Clerk.
Clerk's Office from 9 A. M to 4 P. M.
Court opens at 10 o'clock.
Fourth District — Twenty-fourth, Twenty-fifth, Twenty-sixth, Twenty-seventh and Twenty-eighth Wards. Court-room No. 14 Howard avenue.
Thomas H. Williams, Justice.
G. J. Wiederhold, Clerk.
R. M. Bennett, Assistant Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Fifth District—Eighth, Twenty-second, Twenty-ninth, Thirtieth, Thirty-first and Thirty-second Wards. Court-house northwest corner of Fifty-third street and Third avenue.
Cornelius Furgueson, Justice. Jeremiah J. O'Leary, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.

BOROUGH OF QUEENS.

First District—First Ward (all of Long Island City, formerly composing five wards). Court-room, No. 46 Jackson avenue, Long Island City.
Clerk's Office open from 9 A. M. to 4 P. M. each day excepting Saturdays, closing at 12 M. Trial days Mondays Wednesdays and Fridays. All other business transacted on Tuesdays and Thursdays.
Thomas C. Kadien, Justice. Thomas F. Kennedy, Clerk
Second District—Second and Third Wards, which includes the territory of the late Towns of Newtown and Flushing. *Court-room, in Court-house of the late* Town of Newtown, corner of Broadway and Court street, Elmhurst, New York. P. O. Address, Elmhurst, New York.
William Rasquin, Jr., Justice. Henry Walter, Jr., Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Third District—Fourth and Fifth Wards, comprising the territory of the former towns and villages of Jamaica, Far Rockaway and Rockaway Beach
James F. McLaughlin, Justice. George W. Damon, Clerk,
Court-house, Town Hall, Jamaica.
Telephone, 189 Jamaica
Clerk's Office open from 9 A. M. to 4 P. M.
Court held on Mondays, Wednesdays and Fridays at 10 o'clock A. M.

BOROUGH OF RICHMOND.

First District—First and Third Wards (Towns of *Castleton* and Northfield). Court-room, former Village Hall, Lafayette avenue and Second street, New Brighton.
John J. Kenny, Justice. Anning S. Prall, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Court held each day, except Saturdays, from 10 A. M.
Second District—Second, Fourth and Fifth Wards (Towns of Middletown, Southfield and Westfield). Court-room, former Edgewater Village Hall, Stapleton.
George W. Stake, Justice. Peter Tiernan, Clerk.
Clerk's Office open from 9 A. M. to 4 P. M.
Court held each day from 10 A. M., and continued until close of business,

DEPARTMENT OF DOCKS AND FERRIES.

DEPARTMENT OF DOCKS AND FERRIES, PIER "A," FOOT OF BATTERY PLACE, NORTH RIVER, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE RECEIVED by the Commissioner of Docks at the above office until 2 o'clock P. M., on

FRIDAY, NOVEMBER 11, 1904.
Borough of Manhattan.

CONTRACT NO 877.

FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR DREDGING ABOUT 2,000 CUBIC YARDS AT THE CHELSEA SECTION, ON THE NORTH RIVER.

The time for the completion of the work and the full performance of the contract is on or before the expiration of 15 calender days.

The amount of security required is Four Thousand Four Hundred Dollars.

The bids will be compared and the contract awarded at a *lump or aggregate sum.*

Dredging will be required to be done at the time and in the manner and in such quantities as may be directed.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the said Department

MAURICE FEATHERSON,
Commissioner of Docks.

Dated OCTOBER, 1904. 01,11

☞**See General Instructions to Bidders on the last page, last column, of the "City Record."**

DEPARTMENT OF DOCKS AND FERRIES, PIER "A," FOOT OF BATTERY PLACE, NORTH RIVER, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE *received by the Commissioner of Docks at the* above office until 2 o'clock P. M., on

WEDNESDAY, NOVEMBER 9, 1904.
Borough of Manhattan.

CONTRACT No. 851.

FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR FURNISHING AND DELIVERING MISCELLANEOUS SUPPLIES.

The time for the completion of the work and the full performance of the contract is on or before the expiration of 180 calendar days.

The amount of security will be—

For Class I., Wrought-iron, Cast-iron, Steel, etc., the sum of Nine Thousand Dollars ($9,000).

For Class II., Boilers, Engines, Pumps, etc., the sum of Five Thousand Dollars ($5,000).

For Class III., Pipes, Fittings, Valves, Sheet Metal, etc., the sum of One Thousand Five Hundred Dollars ($1,500).

For Class IV., Lumber, etc., the sum of Five Thousand Two Hundred Dollars ($5,200).

For Class V., Hardware, etc., the sum of Four Thousand Dollars ($4,000).

For Class VI., Miscellaneous, the sum of Three Thousand Dollars ($3,000).

For Class VII., Paints, Oils, etc., the sum of One Thousand Two Hundred Dollars ($1,200).

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed, per pound, ton, dozen, gallon yard or other unit of measure, by which the bids will be tested. The extensions must be made and footed up, as the bids will be read from the total for each class and awards made to the lowest bidder on each class.

Delivery will be required to be made at the time and in the manner and in such quantities as may be directed.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the said Department.

MAURICE FEATHERSON,
Commissioner of Docks.

Dated OCTOBER 24, 1904. 027,n9

☞**See General Instructions to Bidders on the last page, last column, of the "City Record."**

DEPARTMENT OF DOCKS AND FERRIES, PIER A NORTH RIVER, NEW YORK, MARCH 31, 1904.

THE COMMISSIONER HAS FIXED THE amounts of bonds required on contracts awarded by this Department, as follows:

On all contracts for supplies, 40 per cent. of the estimated cost:

On all contracts, other than contracts for supplies, where the estimated cost is not over $200,000, 40 per cent. of the estimated cost;

On all contracts, other than contracts for supplies, where the estimated cost is over $200,000, but not over $1,000,000, 25 per cent. of the estimated cost;

On all contracts, other than contracts for supplies where the estimated cost is over $1,000,000, 20 per cent. of the estimated cost.

CHARLES J. COLLINS,
Secretary.

BOARD OF ASSESSORS.

PUBLIC NOTICE IS HEREBY GIVEN TO THE owner or owners of all houses and lots, improved or unimproved lands affected thereby, that the following *proposed assessments have been completed* and are lodged in the office of the Board of Assessors for examination by all persons interested, viz.:

BOROUGH OF THE BRONX.

List 8115, No. 1. Regulating, grading, curbing and flagging East One Hundred and Eighty-first *street, from Park avenue to Third avenue.*

List 8164, No. 2. Paving the roadway of Jackson avenue with asphalt pavement on a concrete foundation and setting curbstones where required, from East One Hundred and Sixty-first street to East One Hundred and Sixty-fifth street.

List 8168, No. 3. Paving the roadway of East One Hundred and Thirty-sixth street with asphalt pavement on a concrete foundation, and setting curb where necessary, from Brook avenue to St. Ann's avenue.

List 8170, No. 4. Paving with granite block pavement on concrete foundation the carriageway of and laying crosswalks in Westchester avenue, from Prospect avenue to Southern Boulevard.

The limits within which it is proposed to lay the said assessments include all the several houses and lots of ground, vacant lots, pieces and parcels of land situated on—

No. 1. Both sides of One Hundred and Eighty-first street, from Third avenue to Park avenue, and to the extent of half the block at the intersecting and terminating streets.

No. 2. Both sides of Jackson avenue, from One Hundred and Sixty-first street to One Hundred and Sixty-fifth street, and to the extent of half the block at the intersecting and terminating streets.

No. 3. Both sides of East One Hundred and Thirty-sixth street, from St. Ann's avenue to Brook avenue, and to the extent of half the block at the intersecting and terminating streets.

No. 4. Both sides of Westchester avenue, from Prospect avenue to the Southern Boulevard, and to the extent of half the block at the intersecting and terminating streets.

All persons whose interests are affected by the above-named proposed assessments, and who are opposed to the same, or either of them, are requested to present their objections, in writing, to the Secretary of the Board of Assessors, No. 320 Broadway, New York, on or before November 29, 1904, at 1 P. M., at which time and place the said objections will be heard and testimony received in reference thereto.

ROBERT MUH,
ANTONIO ZUCCA,
CHARLES A. O'MALLEY,
Board of Assessors.

WILLIAM H. JASPER,
Secretary,
No. 320 Broadway.

CITY OF NEW YORK, BOROUGH OF MANHATTAN, October 28, 1904.

028,n9

PUBLIC NOTICE IS HEREBY GIVEN TO the owner or owners of all houses and lots, improved or unimproved lands affected thereby, that the following proposed assessments have been completed and are lodged in the office of the Board of Assessors for examination by all persons interested, viz.:

BOROUGH OF THE BRONX.

List 8101, No. 1. Regulating, grading, curbing, flagging and laying crosswalks in Hull avenue, from East Two Hundred and Seventh street to Gun Hill road.

List 8111, No. 2. Regulating, grading, curbing and flagging East One Hundred and Seventy-third street, from Boston road to Crotona Park, East.

List 8117, No. 3. Regulating, grading, curbing, flagging and laying crosswalks in East One Hundred and Eighty-fourth street, from Park to Third avenue.

List 8161, No. 4. Paving the roadway of Belmont place (East One Hundred and Eighty-fourth street) with asphalt on a concrete foundation, from Third avenue to Arthur avenue.

BOROUGH OF MANHATTAN.

List 8048, No. 5. Paving with asphalt blocks Convent avenue, from One Hundred and Forty-first street to One Hundred and Forty-fifth street.

List 8053, No. 6. Receiving-basins north and south sides of Sixty-sixth street, adjoining wall of New York Central and Hudson River Railroad; northwest corner Lenox avenue and One Hundred and Thirteenth street; southwest corner One Hundred and Twenty-sixth street and Columbus avenue; northwest corner One Hundred and Twenty-seventh street and Convent avenue; southwest corner Central Park, West, and Sixty-third street; and alteration and improvement to receiving-basins on the northeast and southeast corners of Seventy-ninth street and Riverside drive.

List 8187, No. 7. Constructing sewers in Wicker place, from the end of the present sewer to Van Corlear place, and in Van Corlear place, between Wicker place and Kingsbridge avenue.

The limits within which it is proposed to lay the said assessments include all the several houses and lots of ground, vacant lots, pieces and parcels of land situated on—

No. 1. Both sides of Hull avenue, from Two Hundred and Seventh street to Gun Hill road, and to the extent of half the block at the intersecting and terminating streets.

No. 2. Both sides of East One Hundred and Seventy-third street, from Boston road to Crotona Park, East, and to the extent of half the block at the inersecting and terminating streets.

No. 3. Both sides of East One Hundred and Eighty-fourth street, from Third avenue to Park avenue, and to the extent of half the block at the intersection of Third avenue, Bassford avenue and Park avenue.

No. 4. Both sides of Belmont place (East One Hundred and Eighty-fourth street), from Third avenue to Arthur avenue, and to the extent of half the block at the intersecting and terminating streets.

No. 5. Both sides of Convent avenue, from One Hundred and Forty-first to One Hundred and Forty-fifth street, and to the extent of half the block at the intersecting and terminating streets.

No. 6. Both sides of Sixty-sixth street, from West End avenue to the New York and Hudson River Railroad; west side of West End avenue, from Sixty-fifth to Sixty-seventh street; north side of One Hundred and Thirteenth street, from Lenox avenue to St. Nicholas avenue; east side of St. Nicholas avenue, from One Hundred and Thirteenth to One Hundred and Fourteenth street; south side of One Hundred and Twenty-sixth street and Lawrence street extending about 415 feet west of Columbus avenue; west side of Convent avenue, from One Hundred and Twenty-seventh to One Hundred and Thirtieth street; south side of Sixty-third street extending about 328 feet west of Central Park, West, and west side of Central Park, West, extending about 101 feet south of Sixty-third street; both sides of Seventy-ninth street, from West End avenue to Riverside drive; east side of Riverside drive, from Seventy-eighth to Eightieth street; west side of West End avenue, from Seventy-eighth to Seventy-ninth street.

No. 7. Both sides of Van Corlear place, from Wicker place to Kingsbridge avenue, and both sides of Wicker place, from Kingsbridge avenue to Van Corlear place.

All persons whose interests are affected by the above-named proposed assessments, and who are opposed to the same, or either of them, are requested to present their objections, in writing, to the Secretary of the Board of Assessors, No. 320 Broadway, New York, on or before November 22, 1904, at 1 P. M., at which time and place the said objections will be heard and testimony received in reference thereto.

ROBERT MUH,
ANTONIO ZUCCA,
CHARLES A. O'MALLEY,
Board of Assessors.

WILLIAM H. JASPER,
Secretary,
No. 320 Broadway.

CITY OF NEW YORK, BOROUGH OF MANHATTAN, October 21, 1904.

021,n1

DEPARTMENT OF STREET CLEANING.

MAIN OFFICE OF THE DEPARTMENT OF STREET CLEANING, ROOM 1421, NOS 13-21 PARK ROW, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Commissioner of Street Cleaning, at the above office until 12 o'clock M, on

TUESDAY, NOVEMBER 22, 1904.

Borough of Brooklyn.

No. 1. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED TO CONSTRUCT A STABLE ON THE BLOCK BOUNDED BY FLUSHING AVENUE, GRAHAM STREET, KENT AVENUE AND LITTLE NASSAU STREET.

The time for the completion of the work and the full performance of the contract is by or before 208 days.

The amount of the security required is fifty per cent. of the amount of the bid.

No. 2. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED TO CONSTRUCT AND INSTALL HEATING AND VENTILATION IN THE ABOVE-MENTIONED STABLE BUILDING.

The time for the completion of the work and the full performance of the contract is by or before one hundred and eighty (180) days.

The amount of the security required is fifty per cent. of the amount of the bid.

No. 3. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED TO CONSTRUCT AND INSTALL PLUMBING AND GAS-FITTING IN THE ABOVE-MENTIONED STABLE BUILDING.

The time for the completion of the work and the full performance of the contract is one hundred and eighty (180) days.

The amount of the security required is fifty per cent. of the amount of the bid.

No. 4. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED TO CONSTRUCT AND INSTALL ELECTRIC WORK IN THE ABOVE-MENTIONED STABLE BUILDING.

The time for the completion of the work and the full performance of the contract is by or before one hundred and eighty (180) days.

The amount of the security required is fifty per cent. of the amount of the bid.

Bids for Contract No. 1 will be at a stated aggregate price, with increases or reductions for different items of the work, as specified in the form of bid or estimate prepared for the purpose.

Bids for each of the other above-mentioned contracts will be at a lump or aggregate sum each.

The bids will be compared and the contracts awarded to the lowest bidder for each contract.

The payments to be made by The City of New York for the performance of the above-mentioned contracts will be made out of an issue of bonds, as provided by sections 48 and 546 of the Greater New York Charter, and as the amount so authorized is not to exceed $370,000 bids cannot be considered which will involve an expenditure in the aggregate greater than the said sum of $370,000.

Blank forms and further information may be obtained and the specifications, plans and drawings may be seen at the office of the Department of Street Cleaning, the Borough of Manhattan, Nos. 13-21 Park row.

JOHN McG. WOODBURY,
Commissioner of Street Cleaning.

Dated OCTOBER 18, 1904. 028,n22

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

ASHES, ETC., FOR FILLING IN LANDS.

PERSONS HAVING LANDS OR PLACES in the vicinity of New York Bay to fill in can procure material for that purpose—ashes, street sweepings, etc., collected by the Department of Street Cleaning—free of charge by applying to the Commissioner of Street Cleaning, Nos. 13 to 21 Park Row, Borough of Manhattan.

JOHN McGAW WOODBURY,
Commissioner of Street Cleaning.

FIRE DEPARTMENT.

HEADQUARTERS FIRE DEPARTMENT, CITY OF NEW YORK, NOS. 157-159 EAST SIXTY-SEVENTH STREET, NEW YORK, October 26, 1904.

A. SEBASTIAN, AUCTIONEER,

ON BEHALF OF THE FIRE DEPARTMENT of The City of New York, will offer for sale at public auction to the highest bidder for cash, at the storeroom of this Department, No. 439 East Sixty-eighth street, Manhattan, at 12 o'clock M. Wednesday, November 9, 1904, the following condemned property, which is of no further use to this Department:

Lot No. 1. 10 tons of lead (more or less).
Lot No. 2. 1½ tons of copper (more or less).
Lot No. 3. 3 tons of iron (more or less).
Lot No. 4. 500 pounds of zinc (more or less).
Lot No. 5. 1,500 pounds old rope (more or less).
Lot No. 6. 1 old buggy.
Lot No. 7. 250 feet old submarine cable.
Lot No. 8. 2 15-inch gongs.

Each lot will be sold separately.

The right to reject all bids is reserved.

The highest bidder for Lots Nos. 6, 7 and 8, in case the bid is accepted, will be required to pay for same in cash at the time of sale and must remove the articles within 24 hours thereafter; the highest bidder for Lots Nos. 1, 2, 3, 4 and 5, in case the bid is accepted, will be required to pay for the same in cash at the time of weighing and delivery.

All of the above property may be seen at any time before the day of sale at the place above specified.

NICHOLAS J. HAYES,
Fire Commissioner.

027,n9

HEADQUARTERS FIRE DEPARTMENT, CITY OF NEW YORK, NOS. 157-159 EAST SIXTY-SEVENTH STREET, NEW YORK, October 20, 1904.

THE FOLLOWING SPECIFICATIONS FOR perforated pipe work in cellars and sub-cellars, required under the provisions of section 762, chapter 378, Laws 1897, as amended, and section 102 of the Building Code, are hereby approved and established, to take effect immediately:

Perforated Pipes in Cellars and Sub-cellars.

All perforated pipes are to be of wrought iron or steel, and capable of withstanding a pressure of 300 pounds to the square inch.

They shall be suspended with proper hangers, not less than 6 inches below the ceiling and parallel thereto, running full depth of building and placed 12½ feet apart on centres and 6 feet from side walls, to be securely fastened and properly braced to withstand vibration.

Pipe shall be 1½ inches internal diameter perforated with 1-16-inch holes; holes to be on the quarters 2 inches apart longitudinally and to be staggered, making 24 holes to the running foot of pipe. Holes must be drilled, not punched.

These 1½-inch pipes to be connected with a feed pipe 4 inches internal diameter, placed close to and parallel to front or side walls of building and connected by and with a 4-inch pipe terminating outside of said wall in a 3-inch Siamese connection, to be fitted with proper clapper valve or valves. One Siamese connection to furnish water to no more than a total of 400 feet of perforated pipe. No single line to be longer than 100 feet.

Sub-cellars require separate equipment.

Cast-iron fittings must not be used.

All unnecessary bends will be avoided, and where needed such bends or curves to be easy and of a radius not less than six times the diameter of the pipe.

A suitable iron plate on outside of building, with raised letters, must be fastened to the wall, or other approved place near cellar connection, to read: "THIS CONNECTION LEADS TO PERFORATED PIPES IN CELLAR."

Separate sign for sub-cellar.

Drawings and duplicate, consisting of plans and sections drawn to ⅛-inch scale, showing proposed location of pipe, must be submitted for approval to the Bureau of Violations and Auxiliary Fire Appliances, where information as to conditions not covered by above specifications will be furnished on application. Manhattan office of the above Bureau is located at Nos. 157 and 159 East Sixty-seventh street. Brooklyn office at Nos. 365 and 367 Jay street, Brooklyn.

NICHOLAS J. HAYES,
Fire Commissioner.

022,n2

HEADQUARTERS OF THE FIRE DEPARTMENT OF THE CITY OF NEW YORK, NOS. 157 AND 159 EAST SIXTY-SEVENTH STREET, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Fire Commissioner at the above office until 10.30 o'clock A. M., on

TUESDAY, NOVEMBER 1, 1904.

Boroughs of Manhattan and The Bronx.

No. 1. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR REPAIRS TO QUARTERS OF ENGINE COMPANY NO. 70, LOCATED ON SCOFIELD AVENUE, CITY ISLAND, BOROUGH OF THE BRONX.

The time for the completion of the work and the full performance of the contract is thirty (30) days.

The amount of security required is Seven Hundred Dollars.

Bids will be compared and the contract awarded at a lump or aggregate sum.

No. 2. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR REPAIRS TO QUARTERS OF ENGINE COMPANY NO. 52, LOCATED ON RIVERDALE AVENUE, BOROUGH OF THE BRONX.

The time for the completion of the work and the full performance of the contract is twenty (20) days.

The amount of security required is Eight Hundred Dollars.

Bids will be compared and the contract awarded at a lump or aggregate sum.

Delivery will be required to be made at the time and in the manner and in such quantities as may be directed.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Fire Department, Nos. 157 and 159 East Sixty-seventh street, Manhattan.

NICHOLAS J. HAYES,
Fire Commissioner.

Dated OCTOBER 20, 1904. 020,n1

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

HEADQUARTERS OF THE FIRE DEPARTMENT OF THE CITY OF NEW YORK, NOS. 157 AND 159 EAST SIXTY-SEVENTH STREET, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Fire Commissioner at the above office until 10.30 o'clock A. M., on

TUESDAY, NOVEMBER 1, 1904.

Boroughs of Brooklyn and Queens.

No. 1. FOR FURNISHING AND DELIVERING TWENTY-FIVE HUNDRED FEET OF 3½-INCH COTTON RUBBER-LINED FIRE HOSE.

The time for the delivery of the articles, materials and supplies and the performance of the contract is sixty (60) days.

The amount of security required is Eighteen Hundred Dollars ($1,800).

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed, per pound, ton, dozen, gallon, yard or other unit of measure, by which the bids will be tested. The extensions must be made and footed up, as the bids will be read from the total and the contract awarded at a lump or aggregate sum.

Delivery will be required to be made at the time and in the manner and in such quantities as may be directed.

Blank forms and further information may be obtained at the office of the Fire Department, Nos. 157 and 159 East Sixty-seventh street, Manhattan.

NICHOLAS J. HAYES,
Fire Commissioner.

Dated OCTOBER 20, 1904. 020,n1

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

DEPARTMENT OF PARKS.

OFFICE OF THE DEPARTMENT OF PARKS, ARSENAL BUILDING, FIFTH AVENUE AND SIXTY-FOURTH STREET, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK

SEALED BIDS OR ESTIMATES WILL BE received by the Park Board at the above office of the Department of Parks until 3 o'clock P. M., on

THURSDAY, NOVEMBER 10, 1904.

Borough of Brooklyn.

FOR FURNISHING ALL THE LABOR AND MATERIALS TO BUILD ROADWAY AND WALKS IN REAR OF INSTITUTE OF ARTS AND SCIENCES, BOROUGH OF BROOKLYN.

The time allowed to complete the whole work will be 60 consecutive working days.

The amount of security required is Five Thousand Dollars.

The bids will be compared and the contract awarded at a lump or aggregate sum

Blank forms may be obtained and plans may be seen at the office of the Department of Parks, Litchfield Mansion, Prospect Park, Brooklyn.

JOHN J. PALLAS, President;
JOHN J. BRADY,
MICHAEL J. KENNEDY,
Commissioners of Parks.

Dated OCTOBER , 1904. 022 n10

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

OFFICE OF THE DEPARTMENT OF PARKS, ARSENAL BUILDING, FIFTH AVENUE AND SIXTY-FOURTH STREET, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Park Board at the above office of the Department of Parks until 3 o'clock P. M., on

THURSDAY, NOVEMBER 3, 1904.

Borough of The Bronx.

No. 1. FURNITURE OF ADDITION TO AND REPAIRS TO FURNITURE OF PUBLIC SCHOOL 29, ON WEST SIDE OF TRINITY AVENUE, BETWEEN ONE HUNDRED AND THIRTY-FIFTH AND ONE HUNDRED AND THIRTY-SIXTH STREETS, BOROUGH OF THE BRONX.

The time of completion is 60 working days, as provided in the contract.

The amount of security required is as follows:

Item 1	$900 00
Item 2	900 00

Borough of Manhattan.

No. 2. ITEM 2, SANITARY WORK OF ADDITION TO AND ALTERATIONS IN PUBLIC SCHOOL 84, NO. 430 WEST FIFTIETH STREET, BOROUGH OF MANHATTAN.

The time of completion is 90 working days.

The amount of security required is Two Thousand Dollars.

No. 3. INSTALLING ELECTRIC EQUIPMENT IN NEW PUBLIC SCHOOL 62, ON NORTHERLY SIDE OF HESTER STREET, BETWEEN ESSEX AND NORFOLK STREETS, BOROUGH OF MANHATTAN.

The time of completion is 140 working days.

The amount of security required is Ten Thousand Dollars.

Various Boroughs.

No. 4. INSTALLING ADDITIONS TO HEATING APPARATUS IN PUBLIC SCHOOLS 122, NINTH STREET AND FIRST AVENUE, AND 137, GRAND, ESSEX AND LUDLOW STREETS, BOROUGH OF MANHATTAN; ALSO PUBLIC SCHOOL 133, BUTLER STREET, BETWEEN FOURTH AND FIFTH AVENUES, BOROUGH OF BROOKLYN, AND PUBLIC SCHOOL 20, HERBERTON AVENUE, PORT RICHMOND, BOROUGH OF RICHMOND.

The time allowed to complete the whole work on each school will be 60 working days, as provided in the contract.

The amount of security required on each school will be as follows:

Public School 122, Manhattan	$400 00
Public School 137, Manhattan	400 00
Public School 133, Brooklyn	400 00
Public School 20, Richmond	500 00

A separate proposal shall be submitted for the work on each school and award will be made thereon.

On Contracts Nos. 2 and 3 the bids will be compared and the contract awarded in a lump sum to the lowest bidder on each contract.

On Contracts Nos. 1 and 4 the bidders must state the price of each or any article or item contained in the specifications or schedules herein contained or hereto annexed by which the bids will be tested.

The extensions must be made and footed up, as the bids will be read from the total of each item and award will be made to the lowest bidder on each item.

Delivery will be required to be made at the time and manner and in such quantities as may be directed.

Blank forms may be obtained and the plans and drawings may be seen at the office of the Superintendent of Public Buildings and Offices, Nos. 1 and 3 Park avenue, Manhattan.

Blank forms may be obtained at the office of the Department of Parks, Zbrowski Mansion, Claremont Park, The Bronx.

JOHN J. PALLAS, President;
JOHN J. BRADY,
MICHAEL J. KENNEDY,
Commissioners of Parks.

Dated OCTOBER 21, 1904. 022,n3

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

OFFICE OF THE DEPARTMENT OF PARKS, ARSENAL BUILDING, FIFTH AVENUE AND SIXTY-FOURTH STREET, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Park Board at the above office of the Department of Parks until 3 o'clock P. M., on

THURSDAY, NOVEMBER 3, 1904.

Borough of The Bronx.

FOR FURNISHING ALL THE LABOR AND MATERIAL FOR INSTALLING AN AUTOMATIC STEAM-HEATING SYSTEM IN THE TREMPER HOUSE IN VAN CORTLANDT PARK, IN THE CITY OF NEW YORK.

The time allowed for doing and completing the work will be 40 consecutive working days.

The security required will be Six Hundred Dollars ($600).

The bids will be compared and the contract awarded at a lump or aggregate sum

Blank forms may be obtained at the office of the Department of Parks, Zbrowski Mansion, Claremont Park, Bronx.

JOHN J. PALLAS,
JOHN J. BRADY,
MICHAEL J. KENNEDY,
Commissioners of Parks.

Dated OCTOBER 20, 1904. 021,n3

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

OFFICE OF THE DEPARTMENT OF PARKS, ARSENAL BUILDING, FIFTH AVENUE AND SIXTY FOURTH STREET, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Park Board at the above office of the Department of Parks until 3 o'clock P. M., on

THURSDAY, NOVEMBER 3, 1904.

Borough of Manhattan.

No. 1. FOR FURNISHING AND DELIVERING LUMBER.

The time allowed for the delivery of the material will be thirty days.

The amount of security required is One Thousand Dollars.

No. 2. FOR FURNISHING AND DELIVERING PAINTER'S SUPPLIES.

The time allowed for the delivery of the material will be thirty days.

The amount of security required is Six Hundred Dollars.

The bids will be compared and the contract awarded at a lump or aggregate sum for each contract.

Blank forms may be obtained at the office of the Department of Parks, Arsenal, Central Park, Manhattan.

JOHN J. PALLAS, President;
JOHN J. BRADY,
MICHAEL J. KENNEDY,
Commissioners.

Dated OCTOBER 15, 1904. 018,n3

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

DEPARTMENT OF EDUCATION.

DEPARTMENT OF EDUCATION, SOUTHWEST CORNER OF PARK AVENUE AND FIFTY-NINTH STREET, BOROUGH OF MANHATTAN, CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Superintendent of School Buildings at the above office of the Department of Education, until 11 o'clock A. M., on

MONDAY, NOVEMBER 7, 1904.

Borough of The Bronx.

No. 1. FURNITURE OF ADDITION TO AND REPAIRS TO FURNITURE OF PUBLIC SCHOOL 29, ON WEST SIDE OF TRINITY AVENUE, BETWEEN ONE HUNDRED AND THIRTY-FIFTH AND ONE HUNDRED AND THIRTY-SIXTH STREETS, BOROUGH OF THE BRONX.

The time of completion is 60 working days, as provided in the contract.

The amount of security required is as follows:

Item 1	$900 00
Item 2	900 00

Borough of Manhattan.

No. 2. ITEM 2, SANITARY WORK OF ADDITION TO AND ALTERATIONS IN PUBLIC SCHOOL 84, NO. 430 WEST FIFTIETH STREET, BOROUGH OF MANHATTAN.

The time of completion is 90 working days.

The amount of security required is Two Thousand Dollars.

No. 3. INSTALLING ELECTRIC EQUIPMENT IN NEW PUBLIC SCHOOL 62, ON NORTHERLY SIDE OF HESTER STREET, BETWEEN ESSEX AND NORFOLK STREETS, BOROUGH OF MANHATTAN.

The time of completion is 140 working days.

The amount of security required is Ten Thousand Dollars.

Various Boroughs.

No. 4. INSTALLING ADDITIONS TO HEATING APPARATUS IN PUBLIC SCHOOLS 122, NINTH STREET AND FIRST AVENUE, AND 137, GRAND, ESSEX AND LUDLOW STREETS, BOROUGH OF MANHATTAN; ALSO PUBLIC SCHOOL 133, BUTLER STREET, BETWEEN FOURTH AND FIFTH AVENUES, BOROUGH OF BROOKLYN, AND PUBLIC SCHOOL 20, HERBERTON AVENUE, PORT RICHMOND, BOROUGH OF RICHMOND.

The time allowed to complete the whole work on each school will be 60 working days, as provided in the contract.

The amount of security required on each school will be as follows:

Public School 122, Manhattan	$400 00
Public School 137, Manhattan	400 00
Public School 133, Brooklyn	400 00
Public School 20, Richmond	500 00

A separate proposal shall be submitted for the work on each school and award will be made thereon.

On Contracts Nos. 2 and 3 the bids will be compared and the contract awarded in a lump sum to the lowest bidder on each contract.

On Contracts Nos. 1 and 4 the bidders must state the price of each or any article or item contained in the specifications or schedules herein contained or hereto annexed by which the bids will be tested.

The extensions must be made and footed up, as the bids will be read from the total of each item and award will be made to the lowest bidder on each item.

Delivery will be required to be made at the time and manner and in such quantities as may be directed.

Blank forms may be obtained and the plans and drawings may be seen at the office of the Superin-

tendent at Estimating Room, Hall of the Board of Education, Park avenue and Fifty-ninth street, Borough of Manhattan; also at branch offices, No. 131 Livingston street, Borough of Brooklyn, and Savings Bank Building, Stapleton, Borough of Richmond, for work for their respective boroughs.

C. B. J. SNYDER,
Superintendent of School Buildings.

OCTOBER 27, 1904. 027,n7

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

POLICE DEPARTMENT.

POLICE DEPARTMENT OF THE CITY OF NEW YORK, No. 300 MULBERRY STREET.

SEALED BIDS OR ESTIMATES WILL BE received by the Police Commissioner of the Police Department of The City of New York at the above office until 2 o'clock P. M., on

THURSDAY, NOVEMBER 3, 1904,

FOR THE INSTALLATION OF STEAM BOILER, HOT WATER BOILER, HOT WATER HEATER, ELECTRIC ELEVATOR PUMP, ETC., IN BOROUGH HEADQUARTERS BUILDING, NO. 269 STATE STREET, BOROUGH OF BROOKLYN.

The time for the completion of the work and the full performance of the contract is 60 days.

The amount of security required is Two Thousand Dollars.

For particulars as to the nature and extent of the work required or of the materials to be furnished bidders are referred to the specifications and to the plans on file in the office of the Inspector of Repairs and Supplies of the Police Department, No. 300 Mulberry street, City of New York.

Blank forms and further information may be obtained at the Central Office of the Police Department, No. 300 Mulberry street, Borough of Manhattan.

WILLIAM McADOO,
Police Commissioner.

Dated OCTOBER 19, 1904. 019,n3

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

POLICE DEPARTMENT—CITY OF NEW YORK, 1899.

OWNERS WANTED BY THE PROPERTY Clerk of the Police Department of The City of New York, No. 300 Mulberry street, Room No. 9, for the following property, now in his custody, without claimants: Boats, rope, iron, lead, male and female clothing, boots, shoes, wine, blankets, diamonds, canned goods, liquors, etc., also small amount of money taken from prisoners and found by Patrolmen of this Department.

THOMAS F. O'CONNOR,
Property Clerk

POLICE DEPARTMENT—CITY OF NEW YORK, BOROUGH OF BROOKLYN.

OWNERS WANTED BY THE DEPUTY Property Clerk of the Police Department of The City of New York—Office, No. 269 State street, Borough of Brooklyn—for the following property, now in his custody, without claimants: Boats, rope, iron, lead, male and female clothing, boots, shoes, wine, blankets, diamonds, canned goods, liquors, etc., also small amount of money taken from prisoners and found by Patrolmen of this Department.

JOSEPH J. CAREY,
Deputy Property Clerk.

BOARD MEETINGS.

The Board of Estimate and Apportionment meet in the Old Council Chamber (Room 16), City Hall, every Friday, at 10.30 o'clock A. M.

JAMES W. STEVENSON,
Deputy Comptroller, Secretary.

The Commissioners of the Sinking Fund meet in the old Council Chamber (Room 16), City Hall, at call of the Mayor.

N. TAYLOR PHILLIPS,
Deputy Comptroller, Secretary.

DEPARTMENT OF HEALTH.

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK, SOUTHWEST CORNER FIFTY-FIFTH STREET AND SIXTH AVENUE, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Board of Health of the Department of Health until 10 o'clock A. M., on

WEDNESDAY, NOVEMBER 16, 1904.

FOR FURNISHING ALL THE LABOR AND FURNISHING AND ERECTING ALL THE MATERIALS NECESSARY OR REQUIRED TO COMPLETE A MORGUE AT THE RIVERSIDE HOSPITAL, NORTH BROTHER ISLAND, BOROUGH OF THE BRONX, CITY OF NEW YORK.

The time for the completion of the work and the full performance of the contract is 60 consecutive working days.

The amount of security required is fifty per cent. (50%) of the amount of the bid.

Bids will be compared and the contract awarded at a lump or aggregate sum.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Chief Clerk of the Department of Health, southwest corner of Fifty-fifth street and Sixth avenue, Borough of Manhattan.

THOMAS DARLINGTON, M. D., President;
ALVAH H. DOTY, M. D.,
WILLIAM McADOO,
Board of Health.

Dated OCTOBER 28, 1904. 028,n16

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK, SOUTHWEST CORNER FIFTY-FIFTH STREET AND SIXTH AVENUE, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Board of Health of the Department of Health until 10 o'clock A. M., on

WEDNESDAY, NOVEMBER 16, 1904.

FOR FURNISHING ALL THE LABOR AND FURNISHING AND ERECTING ALL THE MATERIALS NECESSARY OR REQUIRED TO COMPLETE AN ADMINISTRATION BUILDING AND NURSES' HOME, AT JAMAICA, BOROUGH OF QUEENS, CITY OF NEW YORK.

The time for the completion of the work and the full performance of the contract is One Hundred and Forty consecutive working days.

The amount of security required is fifty per cent. (50%) of the amount of the bid.

Bids will be compared and the contract awarded at a lump or aggregate sum.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Chief Clerk of the Department of Health, southwest corner of Fifty-fifth street and Sixth avenue, Borough of Manhattan.

THOMAS DARLINGTON, M. D., President;
ALVAH H. DOTY, M. D.,
WILLIAM McADOO,
Board of Health.

Dated OCTOBER 20, 1904. 020,n9

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK, SOUTHWEST CORNER FIFTY-FIFTH STREET AND SIXTH AVENUE, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Board of Health until 10 o'clock A. M., on

WEDNESDAY, NOVEMBER 9, 1904.

FOR FURNISHING ALL THE LABOR AND FURNISHING AND ERECTING ALL THE MATERIALS NECESSARY OR REQUIRED TO COMPLETE A LAUNDRY AND DISINFECTING BUILDING AND SEWERAGE DISPOSAL PLANT AT FLUSHING AVENUE, OPPOSITE WATTS LANE, JAMAICA, BOROUGH OF QUEENS, CITY OF NEW YORK.

The time for the completion of the work and the full performance of the contract is 120 consecutive working days.

The amount of security required is fifty per cent. (50%) of the amount of the bid.

Bids will be compared and the contract awarded at a lump or aggregate sum.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Chief Clerk of the Department of Health, southwest corner of Fifty-fifth street and Sixth avenue, Borough of Manhattan.

THOMAS DARLINGTON, M. D., President;
ALVAH H. DOTY, M. D.,
WILLIAM McADOO,
Board of Health.

Dated OCTOBER 21, 1904. 024,n9

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK, SOUTHWEST CORNER FIFTY-FIFTH STREET AND SIXTH AVENUE, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Board of Health of the Department of Health until 10 o'clock A. M., on

WEDNESDAY, NOVEMBER 9, 1904.

FOR FURNISHING ALL THE LABOR AND FURNISHING AND ERECTING ALL THE MATERIALS NECESSARY OR REQUIRED TO ALTER THE BRICK BUILDING (formerly used for coal storage), MAKING IT AVAILABLE FOR USE AS A DISCHARGING AND GOWNING BUILDING, ETC., AT THE RIVERSIDE HOSPITAL, NORTH BROTHER ISLAND, BOROUGH OF THE BRONX, CITY OF NEW YORK.

The time for the completion of the work and the full performance of the contract is sixty consecutive working days.

The amount of security required is fifty per cent. (50%) of the amount of the bid.

Bids will be compared and the contract awarded at a lump or aggregate sum.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Chief Clerk of the Department of Health, southwest corner of Fifty-fifth street and Sixth avenue, Borough of Manhattan.

THOMAS DARLINGTON, M. D., President;
ALVAH H. DOTY, M. D.,
WILLIAM McADOO,
Board of Health.

Dated OCTOBER 20, 1904. 020,n9

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

BOARD OF ESTIMATE AND APPORTIONMENT.

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York so as to change the grades of West One Hundred and Sixty-seventh street, from Amsterdam avenue to Edgecombe road, and Jumel place, from West One Hundred and Sixty-seventh street to Edgecombe road, Borough of Manhattan, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York, on November 11, 1904, at 10.30 o'clock A. M., at which such proposed change will be considered by said Board; all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York by changing the grades of West One Hundred and Sixty-seventh street, from Amsterdam avenue to Edgecombe road, and Jumel place, from West One Hundred and Sixty-seventh street to Edgecombe road, in the Borough of Manhattan, City of New York, more particularly described as follows:

Jumel Place.

Beginning at a point in the westerly line of Edgecombe road and the centre line of Jumel place, elevation 166.52 feet above city datum.

Thence southerly and along the centre line of Jumel place for 662.53 feet to the northerly line of West One Hundred and Sixty-seventh street, elevation 148.85 feet.

West One Hundred and Sixty-seventh Street.

Beginning at a point in the easterly line of Amsterdam avenue and the centre line of West One Hundred and Sixty-seventh street, elevation 145.55 feet above city datum.

Thence easterly along the centre line of West One Hundred and Sixty-seventh street for 471.11 feet to the westerly line of Edgecombe road, elevation 151.81 feet above city datum.

Resolved, That this Board consider the proposed change at a meeting of the Board to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board to be held at the aforesaid time and place, to be published in the CITY RECORD for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone, 3454 Franklin. 026,n5

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York so as to change the grade of Midwood street, between Rogers avenue and Nostrand avenue, Borough of Brooklyn, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York, on November 11, 1904, at 10.30 o'clock A. M., at which such proposed change will be considered by said Board; all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York, by changing the grade of Midwood street, between Rogers avenue and Nostrand avenue, in the Borough of Brooklyn, City of New York, more particularly described as follows:

Beginning at the intersection of Midwood street and Rogers avenue, the elevation to be 59.20 feet, as heretofore.

Thence easterly to a point distant 443 feet from the easterly building line of Rogers avenue, the elevation to be 57.36 feet.

Thence easterly to the intersection of Nostrand avenue, the elevation to be 54.45 feet, as established by a change of grade of Nostrand avenue, filed in the Register's Office of Kings County April 20, 1903.

All elevations refer to mean high-wated datum, as established by the Bureau of Highways, Borough of Brooklyn.

Resolved, That this Board consider the proposed change at a meeting of the Board, to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board, to be held at the aforesaid time and place, to be published in the CITY RECORD and the corporation newspapers for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone, 3454 Franklin. 026,n5

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York so as to change the grade of Stewart street, between Bushwick avenue and Evergreen Cemetery, Borough of Brooklyn, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York, on November 11, 1904, at 10.30 o'clock A. M., at which such proposed change will be considered by said Board, all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York, by changing the grade of Stewart street, between Bushwick avenue and Evergreen Cemetery, in the Borough of Brooklyn, City of New York, more particularly described as follows:

Beginning at the intersection of Stewart street and Bushwick avenue, the elevation to be 107.17 feet, as heretofore.

Thence northerly on an ascending grade of 3.75 feet per hundred to a point 120 feet from the northeasterly curb line of Bushwick avenue, the elevation to be 116.67 feet, as heretofore.

Thence northeasterly on an ascending grade of 6.57 feet per hundred to the westerly boundary line of Evergreen Cemetery, the elevation at the intersection of the northwesterly curb line of Stewart street with the westerly boundary line of Evergreen Cemetery to be 119.45 feet.

Resolved, That this Board consider the proposed change at a meeting of the Board, to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board, to be held at the aforesaid time and place, to be published in the CITY RECORD and the corporation newspapers for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone, 3454 Franklin. 026,n5

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York, so as to change the grade of the sidewalks of Ovington avenue from the fence line to the line of the curb, between Fourth avenue and Fifth avenue, Borough of Brooklyn, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York, on November 11, 1904, at 10.30 o'clock A.M., at which such proposed change will be considered by said Board; all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York, by changing the grade of the sidewalks of Ovington avenue, from the fence line to the line of the curb, between Fourth avenue and Fifth avenue, in the Borough of Brooklyn, City of New York, more particularly described as follows:

North Sidewalk.

Beginning at the easterly curb line of Fourth avenue, the elevation of the north sidewalk of Ovington avenue to be 85.80 feet;

Thence easterly to a point distant 44.5 feet from the intersection of the easterly side line of Fourth avenue with the northerly side line of Ovington avenue, the elevation to be 86.86 feet;

Thence easterly to a point distant 94 feet from the last-mentioned point, the elevation to be 87.15 feet;

Thence easterly on a vertical curve to a point distant 50 feet from the last-mentioned point, the elevation to be 86.59 feet;

Thence easterly on a vertical curve to a point distant 50 feet from the last-mentioned point, the elevation to be 85.02 feet;

Thence easterly to a point distant 135 feet from the last-mentioned point, the elevation to be 79.17 feet;

Thence easterly to a point distant 100 feet from the last-mentioned point, the elevation to be 74.00 feet;

Thence easterly along the present established grade line to Fifth avenue.

South Sidewalk.

Beginning at the easterly curb line of Fourth avenue, the elevation of the south sidewalk of Ovington avenue to be 85.80 feet;

Thence easterly to a point distant 30 feet from the intersection of the easterly side line of Fourth avenue with the southerly side line of Ovington avenue, the elevation to be 87.26 feet;

Thence easterly to a point distant 94 feet from the last-mentioned point, the elevation to be 86.75 feet;

Thence easterly on a vertical curve to a point distant 50 feet from the last-mentioned point, the elevation to be 86.39 feet;

Thence easterly to a point distant 70 feet from the last-mentioned point, the elevation to be 85.16 feet;

Thence easterly to a point distant 130 feet from the last-mentioned point, the elevation to be 78.79 feet;

Thence easterly to a point distant 60 feet from the last-mentioned point, the elevation to be 75.10 feet;

Thence easterly along the present established grade line to Fifth avenue.

All elevations refer to mean high-water datum, as established by the Bureau of Highways, Borough of Brooklyn.

Resolved, That this Board consider the proposed change at a meeting of the Board, to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board, to be held at the aforesaid time and place, to be published in the CITY RECORD and the corporation newspapers for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone 3454 Franklin. 026,n5

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York so as to close and discontinue two public parks and lay out a new public park in place of the proposed Joseph Rodman Drake Park, Borough of The Bronx, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York, on November 11, 1904, at 10.30 o'clock A. M., at which such proposed change will be considered by said Board; all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York by closing and discontinuing two public parks, and laying out a new public park, in the Borough of The Bronx, City of New York, more particularly described as follows:

1. The public park shown upon section 5 of the Final Maps of the Borough of The Bronx, bounded by Eastern Boulevard, Halleck street, Hunt's Point road and Drake street, to be discontinued and closed.

2. The public park shown upon section 5 of the Final Maps of the Borough of The Bronx, bounded by Eastern Boulevard, Hunt's Point road, East Bay avenue and Whittier street, to be discontinued and closed.

3. A new street to be laid out between Longfellow street and Hunt's Point road, the southerly side of such street to be parallel with East Bay avenue and distant 200 feet northerly therefrom, and the northerly side of the said street to be parallel with the southerly side and 50 feet northerly therefrom.

4. Whittier street, as laid out upon section 5 of the Final Maps of the Borough of The Bronx, to be discontinued and closed between the southerly side of Eastern Boulevard and the northerly side of East Bay avenue.

5. A public park to be laid out, bounded on the west by Longfellow street, on the north by the Eastern Boulevard, on the east by Hunt's Point road, and on the south by the new street 50 feet in width above laid out.

Resolved, That this Board consider the proposed change at a meeting of the Board, to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board to be held at the aforesaid time and place, to be published in the CITY RECORD for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone, 3454 Franklin. 026,n5

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York so as to change the grade of Spuyten Duyvil road, at the two crossings of the New York Central and Hudson River Railroad, Borough of The Bronx, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York, on November 11, 1904, at 10.30 o'clock A. M., at which such proposed change will be considered by said Board; all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York by changing the grade of Spuyten Duyvil road at the two crossings of the New York Central and Hudson River Railroad, in the Borough of The Bronx, City of New York, more particularly described as follows:

1. The grade of the floor of the bridge across the New York Central and Hudson River Railroad at the eastern crossing of Spuyten Duyvil road to be 26.74 feet above mean high-water datum, in place of 25 feet as on filed map.

2. The grade of the floor of the bridge across the New York Central and Hudson River Railroad at the western crossing of Spuyten Duyvil road to be 25.57 feet above mean high-water datum, in place of 25 feet as on filed map.

Resolved, That this Board consider the proposed change at a meeting of the Board to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board, to be held at the aforesaid time and place, to be published in the CITY RECORD for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone, 3454 Franklin. 026,n5

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York so as to lay out East One Hundred and Sixtieth street, between Park avenue, West, and Park avenue, East, Borough of The Bronx, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York, on November 11, 1904, at 10 30 o'clock A. M., at which such proposed change will be considered by said Board; all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York by laying out East One Hundred and Sixtieth street, between Park avenue, West, and Park avenue, East, in the Borough of The Bronx, City of New York, more particularly described as follows:

East One Hundred and Sixtieth street is to be laid out at a width of 20 feet, and at right angles over the tracks of the New York and Harlem Railroad, from Park avenue, West, to Park avenue, East, and in such manner that its southern side when prolonged westerly will lead to the southwest corner of East One Hundred and Sixtieth street and Park avenue, West.

Resolved, That this Board consider the proposed change at a meeting of the Board, to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board, to be held at the aforesaid time and place, to be published in the CITY RECORD for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone, 3454 Franklin. 026,n5

NOTICE IS HEREBY GIVEN THAT THE Board of Estimate and Apportionment of The City of New York, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York so as to lay out a public park about a mile west of the property of the Rockaway Park Association, known as Rockaway Park, the same to extend westerly 7,000 linear feet, and in width from the Atlantic Ocean to Jamaica Bay, Borough of Queens, and that a meeting of said Board will be held in the Old Council Chamber, City Hall, Borough of Manhattan, City of New York on November 11, 1904, at 10.30 o'clock A. M., at which such proposed change will be considered by said Board, all of which is more particularly set forth and described in the following resolutions, adopted by the Board on September 30, 1904, notice of the adoption of which is hereby given, viz.:

Resolved, That the Board of Estimate and Apportionment of The City of New York, in pursuance of the provisions of section 442 of the Greater New York Charter, as amended, deeming it for the public interest so to do, proposes to change the map or plan of The City of New York by laying out a public park, about a mile west of the property of the Rockaway Park Associat on, known as Rockaway Park, the same to extend westerly 7,000 linear feet, and in width from the Atlantic Ocean to Jamaica Bay, in the Borough of Queens, City of New York, more particularly described as follows:

All that plot, piece or parcel of land situate, lying and being on Rockaway Beach, in the Fifth Ward, Borough of Queens, City and State of New York, bounded and described as follows:

Beginning at a point where the boundary line between land of the West Rockaway Land Company and land late of Collis P. Huntington, deceased, intersects the high-water mark of Jamaica Bay; running thence southerly 2,790 feet, more or less, to the high-water mark of the Atlantic Ocean; thence running easterly along said high-water mark of the Atlantic Ocean 7,000 feet measured on a line running at right angles to said Huntington's line; thence northerly on a line running parallel with said boundary line 2,284 feet, more or less, to the high-water mark of said Jamaica Bay, and thence westerly following the high-water mark of said Jamaica Bay to the point or place of beginning. The plot of land above described containing 400 acres, more or less.

Resolved, That this Board consider the proposed change at a meeting of the Board, to be held in the City Hall, Borough of Manhattan, City of New York, on the 11th day of November, 1904, at 10.30 o'clock A. M.

Resolved, That the Secretary of this Board cause these resolutions and a notice to all persons affected thereby that the proposed change will be considered at a meeting of the Board, to be held at the aforesaid time and place, to be published in the CITY RECORD for ten days continuously, Sundays and legal holidays excepted, prior to the 11th day of November, 1904.

JOHN H. MOONEY,
Assistant Secretary,
No. 277 Broadway.

Telephone, 3454 Franklin. 026,n5

OFFICIAL PAPERS.

Morning—"The American," "The Morning Telegraph."
Evening—"The Evening Journal" "The Daily News."
Weekly—"Weekly Union," "The New York Realty Journal."
German—"The New Yorker Herold."
Designated by the Board of City Record, September 15, 1904.

MUNICIPAL CIVIL SERVICE COMMISSION.

MUNICIPAL CIVIL SERVICE COMMISSION, No. 61 ELM STREET. CITY OF NEW YORK, October 25, 1904.

PUBLIC NOTICE IS HEREBY GIVEN THAT the examination for the position of Inspector of Lamps and Gas, scheduled to take place on November 3, is canceled.

HENRY BERLINGER,
Secretary.

MUNICIPAL CIVIL SERVICE COMMISSION, No. 61 ELM STREET, CITY OF NEW YORK.

PUBLIC NOTICE WILL BE GIVEN OF ALL competitive examinations two weeks in advance of the date upon which the receipt of applications for any scheduled examination will close. Applications will be received for only such examinations as are scheduled.

When an examination is advertised, a person desiring to compete in the same may obtain an application blank upon request made in writing, or by personal application at the office of the Commission.

All notices of examinations will be posted in the office of the Commission, City Hall, Municipal Building, Brooklyn, and advertised in the CITY RECORD for two weeks in advance of the date upon which the receipt of applications will close for any stated position.

Public notice will also be given by advertisement in most of the City papers.

Wherever an examination is of a technical character, due notice is given by advertisement in the technical journals appertaining to the particular profession for which the examination is called.

Such notices will be sent to the daily papers as matters of news, and to the General Postoffice and stations thereof. The scope of the examination will be stated, but for more general information application should be made at the office of the Commission.

Unless otherwise specifically stated, the minimum age requirement for all positions is 21.

HENRY BERLINGER, Secretary.
19-24-03

DEPARTMENT OF FINANCE.

IMPORTANT TO TAXPAYERS.

DEPARTMENT OF FINANCE,
BUREAU FOR THE COLLECTION OF TAXES,
No. 57 CHAMBERS STREET
(STEWART BUILDING),
NEW YORK, November 1, 1904.

NOTICE IS HEREBY GIVEN TO ALL PERsons whose taxes for the year 1904 have not been paid before the 1st day of November of the said year, that unless the same shall be paid to the Receiver of Taxes at his office in the Borough in which the property is located, as follows:

Borough of Manhattan, No. 57 Chambers street, Manhattan, N. Y.

Borough of The Bronx, corner Third and Tremont avenues, The Bronx, N. Y.

Borough of Brooklyn, Rooms 2, 4, 6 and 8 Municipal Building, Brooklyn, N. Y.

Borough of Queens, corner Jackson avenue and Fifth street, Long Island City, N. Y.

Borough of Richmond, corner Bay and Sand streets, Stapleton, Staten Island, N. Y.

—before the 1st day of December of said year, he will charge, receive and collect upon such taxes so remaining unpaid on that day, in addition to the amount of such taxes, one per centum on the amount thereof, as provided by sections 916 and 918 of the Greater New York Charter (chapter 378, Laws of 1897).

DAVID E. AUSTEN,
Receiver of Taxes.
n1,30

NOTICE OF ASSESSMENTS FOR OPENING STREETS AND PARKS.

IN PURSUANCE OF SECTION 1005 OF THE Greater New York Charter, the Comptroller of The City of New York hereby gives public notice to all persons, owners of property, of the confirmation by the Supreme Court and the entering in the Bureau for the Collection of Assessments and Arrears, of assessments for OPENING AND ACQUIRING TITLE to the following-named streets and avenues in the BOROUGH OF BROOKLYN:

TWENTY-SIXTH WARD, SECTION 13.

HEMLOCK STREET—OPENING, between Glenmore avenue and Sutter avenue. Confirmed September 27, 1904; entered October 28, 1904. Area of assessment includes: All those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point on the southerly side of Glenmore avenue where the same is intersected by the centre line of the block between Hemlock street and Crescent street; running thence southerly and along the centre line of the block between Hemlock street and Crescent street to the northerly side of Sutter avenue; running thence easterly along the northerly side of Sutter avenue to the centre line of the block between Hemlock street and Railroad avenue; running thence northerly and along the centre line of the block between Hemlock street and Railroad avenue to the southerly side of Conduit avenue; running thence northwesterly along the southerly side of Conduit avenue to the easterly side of Hemlock street; running thence northerly along the easterly side of Hemlock street to the prolongation of the southerly side of Glenmore avenue; running thence westerly along the southerly side of Glenmore avenue to the point or place of beginning.

TWENTY-NINTH AND THIRTIETH WARDS, SECTIONS 3, 16 AND 17.

FORTY-FIFTH STREET—OPENING, from old City line to West street. Confirmed September 27, 1904; entered October 28, 1904. Area of assessment includes: All those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point on the northerly side of Forty-fifth Street, where the same is intersected by the old or former City line of Brooklyn, now dividing the Eighth and Thirtieth Wards; running thence northeasterly along the old City line of Brooklyn to the centre line of the block between Forty-fifth and Forty-fourth streets; running thence easterly along the centre line of the block between Forty-fifth street and Forty-fourth street to the westerly side of West street; running thence southerly along the westerly side of West street to the northerly side of Forty-fifth street; running thence easterly along the prolongation of the northerly line of Forty-fifth street to the easterly side of Franklin avenue; running thence southerly along the easterly side of Franklin avenue to the prolongation of the southerly side of Forty-fifth street; running thence westerly along the prolongation of the southerly side of Forty-fifth street to the westerly side of Franklin avenue; thence southerly along the westerly side of Franklin avenue to the centre line of the block between Forty-fifth street and Forty-sixth street, running thence westerly along the centre line of the block between Forty-fifth street and Forty-sixth street to the old City line of Brooklyn; running thence northeasterly along the old City line of Brooklyn to the point or place of beginning.

EIGHTH AND THIRTIETH WARDS, SECTIONS 3, 17 AND 18.

EIGHTH AVENUE—OPENING, from Fiftieth street to Seventh avenue. Confirmed September 14, 1904; entered October 28, 1904. Area of assessment includes: All those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point on the southerly side of Fiftieth street where the same intersects the centre line of the block between Seventh avenue and Eighth avenue; running thence southerly along the centre lines of the blocks between Seventh avenue and Eighth avenue and parallel with Eighth avenue to the northerly side of Seventy-third street; running thence easterly along the northerly side of Seventy-third street to a point distant 350 feet easterly of the easterly side of Eighth avenue; running thence northerly parallel with Eighth avenue to the southerly side of Fiftieth street; running thence westerly along the southerly side of Fiftieth street to the point or place of beginning.

THIRTY-FIRST WARD, SECTION 22.

EAST TWELFTH STREET—OPENING, from Avenue T to Sheepshead Bay road. Confirmed September 14, 1904; entered October 28, 1904. Area of assessment includes all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point on the southerly side of Avenue T where the same intersects the centre line of the block between Homecrest avenue and East Twelfth street; running thence southerly along the centre line of the blocks between Homecrest avenue and East Twelfth street to the northerly side of Sheepshead Bay road; running thence westerly along the northerly side of Sheepshead Bay road to the easterly side of East Twelfth street; running thence southerly along the easterly side of East Twelfth street to the southerly side of Sheepshead Bay road; running thence northwesterly and westerly along the southerly side of Sheepshead Bay road to the westerly side of East Twelfth street; running thence northerly along the westerly side of East Twelfth street to the northerly side of Sheepshead Bay road; running thence westerly along the northerly side of Sheepshead Bay road to the centre line of the block between East Twelfth street and Coney Island avenue; running thence northerly along the centre line of the block between East Twelfth street and Coney Island avenue to the southerly side of Avenue T; running thence easterly along the southerly side of Avenue T to the point or place of beginning.

THIRTY-SECOND WARD, SECTION 23.

EAST FORTIETH STREET—OPENING, from Avenue H to Flatlands avenue. Confirmed September 29, 1904; entered October 28, 1904. Area of assessment includes all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point on the southerly side of Avenue H where the same is intersected by the centre line of the block between East Fortieth street and East Thirty-ninth street; running thence southerly and along the centre line of the block between East Fortieth street and East Thirty-ninth street to the centre line of Hubbard place; running thence southwesterly along the centre line of Hubbard place to the point where the centre line of Hubbard place is intersected by the prolongation of the centre line of the block between Flatbush avenue and East Fortieth street; running thence southeasterly along the centre line of the block between Flatbush avenue and East Fortieth street to the centre line of Overbaugh place; running thence northeasterly along the centre line of Overbaugh place to the point where the centre line of Overbaugh place is intersected by the prolongation of the centre line of the block between East Fortieth street and East Thirty-ninth street; running thence southeasterly and along the centre line of the block between East Fortieth street and East Thirty-ninth street to the centre line of Lott place; running thence southwesterly along the centre line of Lott place to a point where the centre line of Lott place is intersected by the prolongation of the centre line of the block between Flatbush avenue and East Fortieth street; running thence southeasterly along the centre line of the block between Flatbush avenue and East Fortieth street to the northerly side of Flatlands avenue; running thence northeasterly along the northerly side of Flatlands avenue to the centre line of the block between East Fortieth street and East Forty-first street; running thence northwesterly along the centre line of the block between East Fortieth street and East Forty-first street to the southerly side of Avenue K; running thence northerly and parallel with East Fortieth street to the southerly side of Avenue H; running thence westerly along the southerly side of Avenue H to the point or place of beginning.

The above entitled assessments were entered on the day hereinbefore given in the Record of Titles and Assessments, and Arrears of Taxes and Assessments and of Water Rents. Unless the amount assessed for benefit on any person or property shall be paid within sixty days after the date of entry of the assessments, interest will be collected thereon as provided in section 1006 of the Greater New York Charter.

Said section provides that "If any such assessments shall remain unpaid for the period of sixty days after the date of entry thereof in the said Record of Titles of Assessments it shall be the duty of the officer authorized to collect and receive the amount of such assessments to charge, collect and receive interest thereon at the rate of seven per centum per annum to be calculated to the date of payment from the date when such assessments became liens, as provided by section 159 of this act."

Section 150 of this act provides * * * "An assessment shall become a lien upon the real estate affected thereby ten days after its entry in the said record." * * *

The above assessments are payable to the Collector of Assessments and Arrears, at the Bureau for the Collection of Assessments, and Arrears of Taxes and Assessments and of Water Rents, in the Municipal Building, Borough of Brooklyn, between the hours of 9 A. M. and 4 P. M., and on Saturdays from 9 A. M. until 12 M., and all payments made thereon on or before December 27, 1904, will be exempt from interest, as above provided, and after that date will be subject to a charge of interest at the rate of seven per centum per annum, from the date when the above assessments became liens to the date of payment.

EDWARD M. GROUT,
Comptroller.

CITY OF NEW YORK, DEPARTMENT OF FINANCE,
COMPTROLLER'S OFFICE, October 28, 1904.
031,n14

CORPORATION SALE OF REAL ESTATE.

PUBLIC NOTICE IS HEREBY GIVEN THAT the Commissioners of the Sinking Fund of The City of New York, by virtue of the powers vested in them by law, will offer for sale at public auction, on

FRIDAY, NOVEMBER 18, 1904,

at 12 o'clock M., at the Comptroller's office, No. 280 Broadway, Borough of Manhattan, City of New York, all the right, title and interest of The City of New York in and to the following described property which it has by virtue of a lease from William V. B. Bennett, Supervisor of the Town of Gravesend, to the City of Brooklyn, which lease is dated December 24, 1896, and recorded December 29, 1896, in Liber 3, page 249, section 21, in the Kings County Register's office, in and to all that certain lot known as and by the parcel number twenty-four (24), upon the assessment roll, for the opening of Cortlandt street, in the late Town of Gravesend, now Thirty-first Ward, Borough of Brooklyn, City of New York, which was sold to the Town of Gravesend at a sale for unpaid assessments held on the 9th day of August, 1894, for the sum of $20.17, and which said lot was thereafter leased to the City of Brooklyn for 100 years.

The minimum or upset price at which the interest of the City in and to the said premises to be sold is appraised and fixed by the Commissioners of the Sinking Fund at the sum of one hundred and twenty-four dollars and twenty cents ($124.20), the purchaser to pay the auctioneer's fees on the sale. The sale of said premises is to be made on the following

TERMS AND CONDITIONS:

The highest bidder will be required to pay the full amount of his bid or purchase money and the auctioneer's fee at the time of the sale. The quit-claim deed for the above described premises to be delivered within thirty days from the date of the sale.

The Comptroller may, at his option, resell the property if the successful bidder shall fail to comply with the terms of sale, and the person failing to comply therewith will be held liable for any deficiency which may result from any such resale.

The right to reject any bid is reserved.

By order of the Commissioners of the Sinking Fund, under a resolution adopted at a meeting of the Board, held October 21, 1904.

N. TAYLOR PHILLIPS,
Deputy and Acting Comptroller.

CITY OF NEW YORK—DEPARTMENT OF FINANCE,
COMPTROLLER'S OFFICE, October 25, 1904.
028,n18

NOTICE TO PROPERTY-OWNERS.

IN PURSUANCE OF SECTION 1018 OF THE Greater New York Charter, the Comptroller of The City of New York hereby gives public notice to all persons, owners of property, affected by the following assessment for LOCAL IMPROVEMENTS in the BOROUGH OF MANHATTAN:

NINETEENTH WARD, SECTION 4.

RESTORING ASPHALT PAVEMENT ON WEST FORTY-THIRD STREET, between Sixth avenue and Broadway. This assessment was certified to the Collector of Assessments and Arrears, against Block 996, Lot No. 16, under the provisions of section 391 of the Greater New York Charter

—that the same was entered on October 26, 1904, in the Record of Titles of Assessments kept in the Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents, and unless the amount assessed for benefit on any person or property shall be paid within sixty days after the date of said entry of the assessments interest will be collected thereon, as provided in section 1019 of said Greater New York Charter.

Said section provides in part that "If any such assessment shall remain unpaid for the period of sixty days after the date of entry thereof on the said Record of Titles of Assessments it shall be the duty of the officer authorized to collect and receive the amount of such assessment to charge, collect and receive interest thereon at the rate of seven per centum per annum, to be calculated to the date of payment from the date when such assessment became a lien, as provided by section 159 of this act."

Section 159 of this act provides * * * "An assessment shall become a lien upon the real estate affected thereby ten days after its entry in the said record." * * *

The above assessment is payable to the Collector of Assessments and Arrears, at the Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents, Room No. 85, No. 280 Broadway, Borough of Manhattan, between the hours of 9 A. M. and 2 P. M., and on Saturdays from 9 A. M. to 12 M., and all payments made thereon on or before December 27, 1904, will be exempt from interest, as above provided, and after that date will be subject to a charge of interest at the rate of seven per centum per annum from the date when above assessment became a lien to the date of payment.

EDWARD M. GROUT,
Comptroller.

CITY OF NEW YORK—DEPARTMENT OF FINANCE,
COMPTROLLER'S OFFICE, October 26, 1904.
028,n11

NOTICE TO PROPERTY-OWNERS.

IN PURSUANCE OF SECTION 1018 OF THE Greater New York Charter, the Comptroller of The City of New York hereby gives public notice to all persons, owners of property, affected by the following assessment for LOCAL IMPROVEMENTS in the BOROUGH OF BROOKLYN.

TWENTY-SIXTH WARD.

BRADFORD STREET — REGULATING, GRADING, CURBING, LAYING CEMENT SIDEWALKS AND PAVING, between Liberty avenue and Pitkin avenue. Area of assessment: Both sides of Bradford street, from Liberty avenue to Pitkin avenue, and to the extent of half the block at the intersecting and terminating streets—

—that the same was confirmed by the Board of Assessors on October 25, 1904, and entered October 26, 1904, in the Record of Titles and Assessments, kept in the Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents, and unless the amount assessed for benefit on any person or property shall be paid within sixty days after the date of said entry of the assessment, interest will be collected thereon as provided in section 1019 of said Greater New York Charter.

Said section provides in part that "If any such assessment shall remain unpaid for the period of sixty days after the date of entry thereof in the said Record of Titles of Assessments, it shall be the duty of the officer authorized to collect and receive the amount of such assessment to charge, collect and receive interest thereon at the rate of seven per centum per annum, to be calculated to the date of payment from the date when such assessment became a lien, as provided by section 159 of this act."

Section 159 of this act provides * * * "An assessment shall become a lien upon the real estate affected thereby ten days after its entry in the said record." * * *

The above assessment is payable to the Collector of Assessments and Arrears at the Bureau for the Collection of Assessments, and Arrears of Taxes and Assessments and of Water Rents, in the Municipal Building, Borough of Brooklyn, between the hours of 9 A. M. and 2 P. M. and on Saturdays from 9 A. M. until 12 M., and all payments made thereon on or before December 27, 1904, will be exempt from interest as above provided, and after that date will be subject to a charge of interest at the rate of seven per centum per annum from the date when the above assessment became a lien to the date of payment.

EDWARD M. GROUT,
Comptroller.

CITY OF NEW YORK—DEPARTMENT OF FINANCE,
COMPTROLLER'S OFFICE, October 26, 1904.
027,n10

NOTICE TO PROPERTY-OWNERS.

IN PURSUANCE OF SECTION 1018 OF THE Greater New York Charter, the Comptroller of The City of New York hereby gives public notice to all persons, owners of property, affected by the following assessment for LOCAL IMPROVEMENTS in the BOROUGH OF THE BRONX:

TWENTY-FOURTH WARD, SECTION 11.

BELMONT PLACE—REGULATING, GRADING, SETTING CURBSTONES, FLAGGING SIDEWALKS, LAYING CROSSWALKS, BUILDING APPROACHES AND PLACING FENCES, from Third avenue to Arthur avenue.

Area of assessment: Both sides of Belmont place, from Third avenue to Arthur avenue, and to the extent of half the block at the intersecting and terminating streets.

—that the same was confirmed by the Board of Assessors on October 25, 1904, and entered on October 26, 1904, in the Record of Titles of Assessments kept in the Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents, and unless the amount assessed for benefit on any person or property shall be paid within sixty days after the date of said entry of the assessments, interest will be collected thereon, as provided in section 1019 of said Greater New York Charter. Said section in part provides that "If any such assessment shall remain unpaid for the period of sixty days after the date of entry thereof on the said Record of Titles of Assessments, it shall be the duty of the officer authorized to collect and receive the amount of such assessment to charge, collect and receive interest thereon at the rate of seven per centum per annum, to be calculated to the date of payment from the date when such assessment became a lien, as provided by section 159 of this act."

Section 159 of this act provides * * * "An assessment shall become a lien upon the real estate affected thereby ten days after its entry in the said record." * * *

The above assessment is payable to the Collector of Assessments and Arrears at the Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents, in the Municipal Building, corner of One Hundred and Seventy-seventh street and Third avenue, Borough of The Bronx, between the hours of 9 A. M and 2 P. M., and on Saturdays from 9 A. M. to 12 M., and all payments made thereon on or before December 27, 1904, will be exempt from interest, as above provided, and after that date will be subject to a charge of interest at the rate of seven per centum per annum from the date when above assessment became a lien to the date of payment.

EDWARD M. GROUT,
Comptroller.

CITY OF NEW YORK—DEPARTMENT OF FINANCE, COMPTROLLER'S OFFICE, October 26, 1904.

027,n10.

NOTICE TO PROPERTY-OWNERS.

IN PURSUANCE OF SECTION 1018 OF THE Greater New York Charter, the Comptroller of The City of New York hereby gives public notice to all persons, owners of property, affected by the following assessments for LOCAL IMPROVEMENTS in the BOROUGH OF THE BRONX:

TWENTY-THIRD WARD, SECTION 9.

COURTLANDT AVENUE—FENCING VACANT LOT AND REPAIRING SIDEWALK in front of No. 767. Area of assessment: West side of Courtlandt avenue, commencing about 102 feet south of One Hundred and Fifty-seventh street, on Block 2416, Lot No. 47.

EAST ONE HUNDRED AND SIXTY-FIFTH STREET—SEWERS and appurtenances, from Lind avenue to Summit avenue, AND SUMMIT AVENUE—SEWER, from East One Hundred and Sixty-fifth to East One Hundred and Sixty-fourth street. Area of assessment: Both sides of One Hundred and Sixty-fifth street, from Lind avenue to Nelson avenue; both sides of Summit avenue, from One Hundred and Sixty-fourth street to a point distant about 345 feet north of One Hundred and Sixty-fifth street; both sides of Ogden avenue, from a point distant about 335 feet south of One Hundred and Sixty-fifth street to a point distant about 200 feet north of One Hundred and Sixty-fifth street.

—that the same were confirmed by the Board of Assessors on Oct ber 17, 1004, and entered on October 19, 1904, in the Record of Titles of Assessments, kept in the Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents, and unless the amount assessed for benefit on any person or property shall be paid within sixty days after the date of said entry of the assessments interest will be collected thereon, as provided in section 1019 of said Greater New York Charter. Said section in part provides that "If any such assessment shall remain unpaid for the period of sixty days after the date of entry thereof on the said Record of Titles of Assessments, it shall be the duty of the officer authorized to collect and receive the amount of such assessment to charge, collect and receive interest thereon at the rate of seven per centum per annum, to be calculated to the date of payment from the date when such assessment became a lien, as provided by section 159 of this act."

Section 159 of this act provides * * * "An assessment shall become a lien upon the real estate affected thereby ten days after its entry in the said record." * * *

The above assessments are payable to the Collector of Assessments and Arrears at the Bureau for the Collection of Assessments and Arrears of Taxes and Assessments and of Water Rents, in the Municipal Building, corner of One Hundred and Seventy-seventh street and Third avenue, Borough of The Bronx, between the hours of 9 A. M. and 2 P. M., and on Saturdays from 9 A. M. to 12 M., and all payments made thereon on or before December 19, 1904, will be exempt from interest, as above provided, and after that date will be subject to a charge of interest at the rate of seven per centum per annum from the date when above assessments became liens to the date of payment.

EDWARD M. GROUT,
Comptroller.

CITY OF NEW YORK—DEPARTMENT OF FINANCE, COMPTROLLER'S OFFICE, October 19, 1904.

020,n2

NOTICE OF SALE OF LANDS AND TENEMENTS WITHIN THAT PART OF THE CITY OF NEW YORK KNOWN AS THE FIRST WARD OF THE BOROUGH OF QUEENS, FORMERLY KNOWN AS LONG ISLAND CITY, FOR THE UNPAID ASSESSMENTS LEVIED FOR IMPROVEMENT OF GRAND AVENUE AND MAIN STREET.

CITY OF NEW YORK, DEPARTMENT OF FINANCE, OFFICE OF THE BUREAU FOR THE COLLECTION OF ASSESSMENTS AND ARREARS, STEWART BUILDING, No. 280 BROADWAY, BOROUGH OF MANHATTAN. July 1, 1904.

UNDER THE DIRECTION OF EDWARD M. Grout, Comptroller of The City of New York, the undersigned hereby gives public notice, pursuant to the provisions of Chapter 514, Laws of 1897, and of the Greater New York Charter, Chapter 466, Laws of 1901,

That the respective owners of the lands and tenements within that part of the City of New York, now known as the First Ward of the Borough of Queens, formerly known as Long Island City, on which the assessments levied for the local improvement known as the IMPROVEMENT OF GRAND AVENUE AND MAIN STREET, confirmed April 1, 1892, now remain unpaid, are required to pay the amount of the assessment *so due and remaining unpaid*, together with the interest thereon at the rate of ten per cent. per annum and the charges of this notice and the advertisement, to the Collector of Assessments and Arrears, at his office in the Department of Finance, Hackett Building, Jackson avenue and Fifth street, Long Island City, Borough of Queens.

And if default shall be made in such payment, such lands and tenements will be sold at public auction, at the office of the Collector of Assessments and Arrears as given herein, in the Borough of Queens, in The City of New York, on Monday, the 5th day of December, 1904, at 1 o'clock P. M., for the lowest term of years for which any person shall offer to take the same, in consideration of advancing the amount of the *assessment so due and unpaid* and the interest and charges thereon, as aforesaid, and all other costs and charges that may have accrued thereon; and such sale shall be continued from time to time until all the lands and tenements as advertised for sale shall be sold

And notice is hereby further given that a detailed statement of the amount due and unpaid on each assessment, a description of the property, and the ownership of the property assessed, is published in a pamphlet, and that copies of the pamphlet are deposited in the offices of the Collector of Assessments and Arrears in the Department of Finance, situated respectively in the Boroughs of Manhattan and Queens, and will be delivered to any person applying for the same.

EDWARD A. SLATTERY,
Collector of Assessments and Arrears.

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INTEREST ON CITY BONDS AND STOCK.

THE INTEREST DUE NOVEMBER 1, 1904, ON the Registered Bonds and Stock of The City of New York will be paid on that day by the Comptroller, at his office in the Stewart Building, corner of Broadway and Chambers street (Room 37).

The Transfer Books thereof will be closed from October 15, 1904, to November 1, 1904.

The interest due November 1, 1904, on the Coupon Bonds and Stock of the present and former City of New York will be paid on that day by the Knickerbocker Trust Company, No. 66 Broadway.

The interest due November 1, 1904, on Coupon Bonds of other Corporations now included in the City of New York will be paid on that day at the office of the Comptroller.

EDWARD M. GROUT, Comptroller.

THE CITY OF NEW YORK—DEPARTMENT OF FINANCE, COMPTROLLER'S OFFICE, September 2, 1904.

s3,n1

DEPARTMENT OF FINANCE, CITY OF NEW YORK, March 26, 1903.

UNTIL FURTHER NOTICE AND UNLESS *otherwise directed in any special case, one* surety company will be accepted as sufficient upon all contracts for supplies for furniture, and for gas and electric lighting to any amount, and upon the following contracts to the amounts named:

For supplies and furniture, with patented articles	$5,000
Regulating, grading, paving (other than asphalt)—	
Not over 2 years	$15,000
Over 2 years	5,000
School building repairs	10,000
Heating and lighting apparatus	5,00
New buildings—New docks	25,000
Sewers—Dredging and water mains—	
Not over 2 years	10,000
Over 2 years	5,000

EDWARD M. GROUT, Comptroller.

DEPARTMENT OF CORRECTION.

OFFICE OF THE DEPARTMENT OF CORRECTION, No. 148 EAST TWENTIETH STREET, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the Commissioner of Correction at the above office until 11 o'clock A. M., on

THURSDAY, NOVEMBER 3, 1904.

Borough of Brooklyn.

No. 2. FOR FURNISHING AND DELIVERING SUPPLIES FOR MANUFACTURING PURPOSES.

The time for the delivery of the articles, materials and supplies and the performance of the contract is by or before 30 days.

The amount of security required is fifty per cent. (50%) of the amount of the bid or estimate.

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed, per pound, ton, dozen, gallon, yard or other unit of measure, by which the bids will be tested. The extensions must be made and footed up, as the bids will be read from the totals and awards made to the lowest bidder on each item.

Delivery will be required to be made at the time and in the manner and in such quantities as may be directed.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Department of Correction, the Borough of Manhattan, No. 148 East Twentieth street.

FRANCIS J. LANTRY,
Commissioner.

Dated OCTOBER 17, 1904. 020,n3

☞See General Instructions to Bidders, on the last page, last column, of the "City Record."

BOROUGH OF BROOKLYN.

OFFICE OF THE PRESIDENT OF THE BOROUGH OF BROOKLYN, ROOM No. 15, MUNICIPAL BUILDING, BOROUGH OF BROOKLYN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE received by the President of the Borough of Brooklyn at the above office until 11 o'clock A. M., on

WEDNESDAY, NOVEMBER 2, 1904.

No. 1. FOR REGULATING AND REPAVING WITH ASPHALT PAVEMENT ON A CONCRETE FOUNDATION THE ROADWAY OF BAINBRIDGE STREET, from Reid avenue to Saratoga avenue.

The Engineer's estimate of the quantities is as follows:

11,520 square yards of asphalt pavement.
1,900 cubic yards of concrete.
3,970 linear feet of new curbstone.
2,130 linear feet of old curbstone, to be reset.
23 noiseless covers and heads, complete, for sewer manholes.

Time allowed for the completion of the work and the full performance of the contract is fifty (50) working days.

The amount of security required is Nine Thousand Dollars.

No. 2. FOR REGULATING AND REPAVING WITH ASPHALT PAVEMENT ON A CONCRETE FOUNDATION THE ROADWAYS OF KENT AVENUE, from Lafayette avenue to Myrtle avenue, AND OF GRAHAM STREET, from Willoughby avenue to Myrtle avenue.

The Engineer's estimate of the quantities is as follows:

7,250 square yards of asphalt pavement.
40 square yards of adjacent pavement.
1,230 cubic yards of concrete.
3,640 linear feet of new curbstone.
900 linear feet of old curbstone, to be reset.
23 noiseless covers and heads, complete, for sewer manholes.

Time allowed for the completion of the work and the full performance of the contract is forty (40) working days.

The amount of security required is Six Thousand Dollars.

No 3. FOR REGULATING, GRADING AND PAVING WITH ASPHALT PAVEMENT ON A CONCRETE FOUNDATION THE ROADWAY OF GRANITE STREET, between Bushwick avenue and the tracks of the Long Island Railroad Company, at Evergreen avenue.

The Engineer's estimate of the quantities is as follows:

1,730 square yards of asphalt pavement.
290 cubic yards of concrete.
1,033 linear feet of new curbstone.
1,405 cubic yards of earth excavation.
28 cubic yards of earth filling, not to be bid for.
5,271 square feet of cement sidewalk.

Time allowed for the completion of the work and the full performance of the contract is thirty (30) working days.

The amount of security required is Two Thousand Dollars.

No. 4. FOR REGULATING AND PAVING WITH ASPHALT PAVEMENT ON A CONCRETE FOUNDATION THE ROADWAY OF PINE STREET, from Fulton street to Ridgewood avenue.

The Engineer's estimate of the quantities is as follows:

2,070 square yards of asphalt pavement.
290 cubic yards of concrete.

Time allowed for the completion of the work and the full performance of the contract is thirty (30) working days.

The amount of security required is One Thousand Two Hundred Dollars.

No. 5. FOR REGULATING AND REPAVING WITH ASPHALT PAVEMENT ON A CONCRETE FOUNDATION THE ROADWAY OF TALMAN STREET, from Bridge street to Jay street.

The Engineer's estimate of the quantities is as follows:

850 square yards of asphalt pavement.
10 square yards of adjacent pavement.
170 cubic yards of concrete.
970 linear feet of new curbstone.
50 linear feet of old curbstone, to be reset.
6 noiseless covers and heads, complete, for sewer manholes.

Time allowed for the completion of the work and the full performance of the contract is twenty (20) working days.

The amount of security required is One Thousand Dollars.

No. 6. FOR REGULATING, GRADING, CURBING AND LAYING SIDEWALKS ON SEVENTY-THIRD STREET, from Fifteenth avenue to New Utrecht avenue.

The Engineer's estimate of the quantities is as follows:

1,512 linear feet of new curbstone, furnished and set in concrete.
7,871 cubic yards of earth excavation.
75 cubic yards of concrete, not to be bid for.
7,360 square feet of cement sidewalks.

Time allowed for the completion of the work and the full performance of the contract is fifty (50) working days.

The amount of security required is One Thousand Two Hundred Dollars.

No. 7. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR THE CONSTRUCTION OF CEMENT CONCRETE SIDEWALKS IN VARIOUS PLACES AND ON VARIOUS STREETS IN THE BOROUGH OF BROOKLYN.

The Engineer's estimate of the quantities is as follows:

11,215 square feet of cement concrete sidewalks.

Time allowed for the completion of the work and the full performance of the contract is thirty (30) working days.

The amount of security required is Six Hundred Dollars.

No. 8. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR THE CONSTRUCTION OF CEMENT CONCRETE SIDEWALKS IN VARIOUS PLACES AND ON VARIOUS STREETS IN THE BOROUGH OF BROOKLYN.

The Engineer's estimate of the quantities is as follows:

19,075 square feet of cement concrete sidewalks.

Time allowed for the completion of the work and the full performance of the contract is forty (40) working days.

The amount of security required is One Thousand Dollars.

No. 9. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR THE FENCING OF VACANT LOTS IN VARIOUS PLACES AND ON VARIOUS STREETS IN THE BOROUGH OF BROOKLYN.

The Engineer's estimate of the quantities is as follows:

1,200 linear feet of fence.

Time allowed for the completion of the work and the full performance of the contract is fifteen (15) working days.

The amount of security required is Two Hundred Dollars.

No. 10. FOR REGULATING, GRADING, CURBING AND LAYING SIDEWALKS ON CONEY ISLAND AVENUE, from 170 feet south of Plaza at Fort Hamilton avenue to Kings Highway.

The Engineer's estimate of the quantities is as follows:

11,530 cubic yards of earth excavation.
23,650 cubic yards of earth filling, to be furnished.
25,260 linear feet of concrete curb.
6,680 square feet of old flagstones, to be relaid.
109,750 square feet of cement sidewalks.

Time for the completion of the work and the full performance of the contract is one hundred and twenty (120) working days.

The amount of security required is Twenty-three Thousand Dollars.

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed, per linear foot, square foot, square yard, cubic yard, or other unit of measure by which the bids will be tested. The bids will be compared and the contract awarded at a lump or aggregate sum for each contract.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Assistant Commissioner of Public Works, Room 15, Municipal Building, Borough of Brooklyn.

MARTIN W. LITTLETON,
President.

Dated OCTOBER 18, 1904. 021,n2

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

OFFICE OF THE PRESIDENT OF THE BOROUGH OF BROOKLYN, ROOM No. 15, MUNICIPAL BUILDING, BOROUGH OF BROOKLYN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE RECEIVED by the President of the Borough of Brooklyn, at the above office, until 11 o'clock A. M., on

WEDNESDAY, NOVEMBER 2 1904.

No. 1. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR CONSTRUCTING SEWER IN EIGHTY-SEVENTH STREET, from Third avenue to Fourth avenue, AND OUTLET SEWER IN EIGHTY-SEVENTH STREET, between Second avenue and Third avenue.

The Engineer's estimate of the quantities is as follows:

45 linear feet 18-inch pipe sewer.
755 linear feet 15-inch pipe sewer.
762 linear feet 12-inch pipe sewer.
15 manholes.
1 sewer basin.
11,000 feet, B. M., foundation planking.
8,000 feet, B. M., sheeting and bracing.
130 cubic yards concrete cradle.

The time allowed for the completion of the work and full performance of the contract is 50 working days.

The amount of security required is Three Thousand Dollars.

No. 2. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR CONSTRUCTING SEWER IN EIGHTY-FIFTH STREET, from First avenue to Third avenue.

The Engineer's estimate of the quantities is as follows:

90 linear feet 15-inch pipe sewer.
1,420 linear feet 12-inch pipe sewer.
16 manholes.
10,000 feet, B. M., foundation planking.
75,000 feet, B. M., sheeting and bracing.
115 cubic yards concrete cradle.

The time allowed for the completion of the work and full performance of the contract is 60 working days.

The amount of security required is Four Thousand Dollars.

No. 3. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR CONSTRUCTING SEWER IN EAST TWENTY-EIGHTH STREET, from Clarendon road to Newkirk avenue, AND OUTLET SEWER IN AVENUE D, between East Twenty-eighth street and East Twenty-ninth street.

The Engineer's estimate of the quantities is as follows:

260 linear feet 30-inch brick sewer.
45 linear feet 15-inch pipe sewer.
1,070 linear feet 12-inch pipe sewer.
13 manholes.
12,000 feet, B. M., foundation planking.
84 cubic yards concrete cradle.
3 sewer basins.

The time allowed for the completion of the work and full performance of the contract is 50 working days.

The amount of security required is Four Thousand Dollars.

No. 4. FOR CONSTRUCTING SEWER BASINS AT THE NORTHEAST AND SOUTHEAST CORNERS OF THIRTIETH STREET AND FOURTH AVENUE, AND SOUTHEAST CORNER OF THIRTY-FOURTH STREET AND FOURTH AVENUE.

The Engineer's estimate of the quantities is as follows:

3 sewer basins.

The time allowed for the completion of the work and full performance of the contract is 30 working days.

The amount of security required is Four Hundred Dollars.

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed per linear foot, foot board measure, cubic yard or other unit of measure, by which the bids will be tested. The bids will be compared and the contract awarded at a lump or aggregate sum for each contract.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Assistant Commissioner of Public Works, Borough of Brooklyn, Room No. 15, Municipal Building, Borough of Brooklyn.

MARTIN W. LITTLETON,
President.

Dated OCTOBER 18, 1904.

☞See General Instructions to Bidders on the last page, last column of the "City Record"

OFFICE OF THE PRESIDENT OF THE BOROUGH OF BROOKLYN, ROOM No. 15, MUNICIPAL BUILDING, BOROUGH OF BROOKLYN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE RECEIVED by the President of the Borough of Brooklyn at the above office until 11 o'clock A. M., on

WEDNESDAY, NOVEMBER 2, 1904.

FOR FURNISHING ALL THE LABOR AND MATERIALS NECESSARY TO ALTER AND REPAIR THE EXTERIOR STONEWORK OF THE BOROUGH HALL, BOROUGH OF BROOKLYN.

The time allowed for the completion of the work and full performance of the contract is sixty (60) working days.

The amount of security required is Eight Hundred Dollars.

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed, by which the bids will be tested. The bids will be compared and the contract awarded at a lump or aggregate sum for each contract.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Assistant Commissioner of Public Works, Room No. 15, Municipal Building, Borough of Brooklyn.

MARTIN W. LITTLETON,
President.

Dated OCTOBER 19, 1904. 020,n2

☞See General Instructions to Bidders on the last page, last column, of the "City Record."

OFFICE OF THE PRESIDENT OF THE BOROUGH OF BROOKLYN, ROOM No. 15, MUNICIPAL BUILDING, BOROUGH OF BROOKLYN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE RECEIVED by the President of the Borough of Brooklyn, at the above office until 11 o'clock A.M., on

WEDNESDAY, NOVEMBER 2, 1904.

No. 1. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR CONSTRUCTING SEWER IN VANDAM STREET, from Meeker avenue to Bridgewater street, etc.

The Engineer's estimate of the quantities is as follows:

825 linear feet 36-inch brick sewer.
45 linear feet 18-inch pipe sewer.
525 linear feet 15-inch pipe sewer.
540 linear feet 12-inch pipe sewer.
18 manholes.
4 sewer-basins.
17,000 feet, B. M., foundation planking.
93 cubic yards concrete cradle.
5 cubic yards concrete, as per Article 61.
45 cubic yards brick masonry, as per Article 61.

The time allowed for the completion of the work and full performance of the contract is one hundred (100) working days.

The amount of security required is Nine Thousand Dollars.

No. 2. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR CONSTRUCTING SEWER IN SHERMAN STREET, from Reeve place to Greenwood avenue.

The Engineer's estimate of the quantities is as follows:

443 linear feet 30-inch brick sewer.
5 manholes.
2,500 feet, B. M., foundation planking.
5 cubic yards concrete.
5 cubic yards brick masonry.

The time allowed for the completion of the work and full performance of the contract is forty (40) working days.

The amount of security required is One Thousand Eight Hundred Dollars.

No. 3. FOR FURNISHING ALL THE LABOR AND MATERIALS REQUIRED FOR CONSTRUCTING SEWER IN GREENWOOD AVENUE, NORTH SIDE, from Coney Island avenue to East Second street.

The Engineer's estimate of the quantities is as follows:

910 linear feet 36-inch brick sewer.
40 linear feet 30-inch brick sewer.
266 linear feet 18-inch pipe sewer.
1,130 linear feet 15-inch pipe sewer.
30 linear feet 12-inch pipe sewer.
21 manholes.
10 sewer-basins.
16,000 feet, B. M., foundation planking.
10,000 feet, B. M., sheeting and bracing.
1 sewer-basin reconnected.
133 cubic yards concrete cradle.
5 cubic yards concrete, as per Article 61.
5 cubic yards brick masonry, as per Article 61.

The time allowed for the completion of the work and full performance of the contract is one hundred (100) working days.

The amount of security required is Nine Thousand Dollars.

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed, per linear feet, feet B. M., cubic yard or other unit of measure, by which the bids will be tested. The bids will be compared and the contract awarded at a lump or aggregate sum for each contract.

Blank forms and further information may be obtained and the plans and drawings may be seen at the office of the Assistant Commissioner of Public Works, Room 15, Municipal Building, Borough of Brooklyn.

MARTIN W. LITTLETON,
President.

Dated OCTOBER 10, 1904. 020,n2

See General Instructions to bidders on the last page, last column, of the "City Record."

OFFICIAL BOROUGH PAPERS.

BOROUGH OF THE BRONX.

"North Side News." "Westchester Independent," "Bronx Sentinel," "Harlem Reporter and Bronx Chronicle," "Bronx Borough Record."

BOROUGH OF RICHMOND.

"Staten Islander," "Staten Island Star," "Richmond County Herald." "Richmond County Democrat," "Staten Island World."

BOROUGH OF QUEENS.

"Long Island Daily Star," "Flushing Daily Times," "Flushing Evening Journal," "Queens Borough Advertiser," "Jamaica Standard," "Rockaway News," "Long Island Farmer."

BOROUGH OF BROOKLYN.

"Brooklyn Eagle," "Brooklyn Times," "Brooklyn Citizen," "Brooklyn Standard Union," "Brooklyner Freie Presse," "Brooklyn Weekly News," "Flatbush Weekly News."

BOROUGH OF MANHATTAN.

"Harlem Local Reporter" (Harlem District), "Democracy" (Washington Heights, Morningside Heights, and Harlem Districts).

Designation by Board of City Record April 26, 1904. Amended July 22 and September 16, 1904.

CHANGE OF GRADE DAMAGE COMMISSION.

TWENTY-THIRD AND TWENTY-FOURTH WARDS.

PURSUANT TO THE PROVISIONS OF CHAPTER 537 of the Laws of 1893 and the Acts amendatory thereof and supplemental thereto, notice is hereby given that meetings of the Commissioners appointed under said Acts will be held at the office of the Commission, Room 138, No. 280 Broadway (Stewart Building), Borough of Manhattan, New York City, on Mondays, Wednesdays and Fridays of each week, at 2 o'clock P. M., until further notice.

Dated NEW YORK CITY, March 26, 1904.

WILLIAM E. STILLINGS,
CHARLES A. JACKSON,
OSCAR S. BAILEY,
Commissioners.

LAMONT MCLOUGHLIN,
Clerk.

DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY.

DEPARTMENT OF WATER SUPPLY, GAS AND ELECTRICITY, ROOM 1536, NOS. 13-21 PARK ROW, BOROUGH OF MANHATTAN, THE CITY OF NEW YORK.

SEALED BIDS OR ESTIMATES WILL BE RECEIVED by the Commissioner of Water Supply, Gas and Electricity at the above office until 2 o'clock P. M. on

WEDNESDAY, NOVEMBER 2, 1904.

Boroughs of Manhattan and The Bronx.

No. 1. FOR FURNISHING, DELIVERING AND LAYING WATER-MAINS IN ARNOLD, BRIGGS, BRONX PARK, CLASSON, COLUMBUS, FRANKLIN, GREEN, HILL, HORTON, MAYFLOWER, MULFORD, PILGRIM, WESTCHESTER AND FOURTH AVENUES; IN ARTHUR, ASH, LEBANON, SOUTH ELIZABETH, THIRD, SEVENTEENTH, TWENTY-FIRST, ONE HUNDRED AND SEVENTY-EIGHTH, ONE HUNDRED AND SEVENTY-NINTH, TWO HUNDRED AND FIFTEENTH AND TWO HUNDRED AND NINETEENTH STREETS; IN GUERLAIN PLACE; IN EASTCHESTER, PELHAM AND WHITE PLAINS ROADS; IN WATSON'S LANE, AND IN LOCUST AVENUE, NORTH OAK DRIVE, SOUTH OAK DRIVE, NORTH CHESTNUT DRIVE AND SOUTH CHESTNUT DRIVE.

The time allowed to complete the whole work will be 300 working days.

The amount of security will be Twenty-five Thousand Dollars.

Borough of Queens.

No. 2. FOR FURNISHING MATERIALS, DELIVERING AND ERECTING TWO SURFACE CONDENSERS AND APPURTENANCES AT PUMPING STATION NO. 1, AND ONE SURFACE CONDENSER AND APPURTENANCES AT FLUSHING PUMPING STATION.

The time allowed to complete the whole work will be 120 calendar days.

The amount of security required will be One Thousand Dollars.

The bidder will state the price of each item or article contained in the specifications or schedules herein contained or hereto annexed, per ton, per linear foot, per hydrant, or other unit of measure, by which the bids will be tested.

Delivery will be required to be made at the time and in the manner and in such quantities as may be directed.

Bids will be compared and each contract awarded at a lump or aggregate sum.

Blank forms may be obtained at the office of the Department of Water Supply, Gas and Electricity, Borough of Manhattan, Nos. 13 to 21 Park row.

JOHN T. OAKLEY,
Commissioner.

Dated OCTOBER 20, 1904. 021,n2

See General Instructions to Bidders on the last page, last column, of the "City Record."

SUPREME COURT.

FIRST DEPARTMENT.

In the matter of acquiring title by The City of New York to premises situated on the southerly side of FIFTIETH STREET, between Lexington and Third avenues, in the Borough of Manhattan, in The City of New York, duly selected as a site for the Fire Department of The City of New York, according to law.

NOTICE IS HEREBY GIVEN THAT THE REport of George W. Miller, Charles W. Dayton, Jr., and Herman Alsberg, Commissioners of Estimate and Appraisal duly appointed in the above-entitled proceeding, which report bears date the 28th day of October, 1904, was filed in the office of the Fire Commissioner, the head of the Fire Department of The City of New York, on the 31st day of October, 1904, and a duplicate of said report was filed on the same day in the office of the Clerk of the County of New York.

Notice is further given that the said report will be presented for confirmation to the Supreme Court of the State of New York, at a Special Term, Part III. thereof, to be held at the County Court-house, in the Borough of Manhattan, in The City of New York, on the 14th day of November, 1904, at the opening of the Court on that day and that then and there, or as soon thereafter as counsel can be heard thereon, a motion will be made that the said report be confirmed.

Dated NEW YORK, October 31, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon Row,
Borough of Manhattan,
City of New York.
n1,12

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title wherever the same has not been heretofore acquired to the lands and premises required for the opening and extending of RAPELJE AVENUE (although not yet named by proper authority), from Thomson avenue to Riker avenue, in the First Ward, Borough of Queens, The City of New York.

NOTICE IS HEREBY GIVEN THAT THE BILL of costs, charges and expenses incurred by reason of the proceedings in the above-entitled matter, will be presented for taxation to one of the Justices of the Supreme Court of the State of New York, Second Department, at a Special term thereof, to be held for the hearing of motions, at the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 16th day of November, 1904, at 10.30 o'clock in forenoon of that day, or as soon thereafter as counsel can be heard thereon, and that the said bill of costs, charges and expenses has been deposited in the office of the Clerk of the County of Queens, there to remain for and during the space of ten days, as required by the provisions of section 999 of the Greater New York Charter, as amended by chapter 466, of the Laws of 1901.

Dated BOROUGH OF MANHATTAN, NEW YORK, November 1, 1904.

JOS. FITCH,
JOHN W. WEED,
GEO. W. DAVISON,
Commissioners.

JOHN P. DUNN,
Clerk. n1,12

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands and premises required for the opening and extending of BORDEN AVENUE (although not yet named by proper authority), from Greenpoint avenue to Bradley avenue, in the First Ward, Borough of Queens, in The City of New York.

WE, THE UNDERSIGNED COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us, at our office, No. 252 Jackson avenue, in the Borough of Queens, in The City of New York, on or before the 21st day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 23d day of November, 1904, at 4 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings in the Law Department of The City of New York, No. 252 Jackson avenue, in the Borough of Queens, in said city, there to remain until the 1st day of December, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Queens, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at the point of intersection of the westerly line of Calvary Cemetery road with a line parallel to and 100 feet northerly from the northerly line of Borden avenue; running thence westerly along said parallel line and a line parallel to and 100 feet northerly from the northerly line of Hunter's Point avenue to its intersection with the middle line of the blocks between School street and Mount street; thence southerly along said middle line of the blocks to its intersection with the middle line of the blocks between Hunter's Point avenue and Borden avenue; thence westerly along the last-mentioned middle line of the blocks to its intersection with the middle line of the blocks between Manly street and Orton street; thence southerly along the last-mentioned middle line of the blocks to its intersection with a line parallel to and 100 feet northerly from the northerly line of Borden avenue; thence westerly along the said line parallel to Borden avenue to its intersection with the easterly line of the freight canal; thence southerly along the easterly line of the freight canal to its intersection with a line parallel to and 100 feet southerly from the southerly line of Borden avenue; thence easterly along said line parallel to Borden avenue to its intersection with the middle line of the blocks between Star avenue and Review avenue; thence southeasterly along said middle line of the blocks to its intersection with the middle line of the blocks between Young avenue and Pearsall avenue; thence northeasterly along the last-mentioned middle line of the blocks to its intersection with the middle line of the blocks between Star avenue and Bradley avenue; thence southeasterly along the last-mentioned middle line of the blocks to its intersection with the middle line of the blocks between Greenpoint avenue and Howard street; thence northeasterly along the last-mentioned middle line of the blocks to its intersection with the middle line of Bradley avenue; thence southeasterly along the middle line of Bradley avenue to the northwesterly line of Howard street; thence northeasterly along the northwesterly line of Howard street to its intersection with a line parallel to and 200 feet southerly from the southerly line of Borden avenue; thence easterly along said parallel line to the westerly line of Calvary Cemetery road; thence northerly along the westerly line of Calvary Cemetery road to the point or place of beginning; excepting from said area all streets, avenues and roads or portions thereof heretofore legally opened as such area is shown upon our benefit maps deposited as aforesaid.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof, for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 24th day of January, 1905, at the opening of the Court on that day.

Dated BOROUGH OF MANHATTAN, NEW YORK, October 19, 1904.

GEO. W. DAVISON,
GEORGE P. STRACK,
Commissioners.

JOHN P. DUNN,
Clerk. 031,n18

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening STARR STREET, between Knickerbocker avenue and St. Nicholas avenue, in the Twenty-seventh Ward in the Borough of Brooklyn, of The City of New York, as the same has been heretofore laid out.

WE, THE UNDERSIGNED COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office, in the office of the Law Department, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, on or before the 21st day of November, 1904; and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 22d day of November, 1904, at 3 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings of the Law Department of The City of New York, in the Borough of Brooklyn, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, there to remain until the 30th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.: Beginning at a point on the westerly side of St. Nicholas avenue where the same is intersected by the centre line of the block betwen Starr street and Willoughby avenue; running thence southwesterly parallel with Starr street to the easterly side of Knickerbocker avenue; running thence northerly and along the easterly side of Knickerbocker avenue to the centre line of the block between Starr street and Troutman street; running thence westerly and along the centre line of the block between Starr street and Troutman street to the westerly side of St. Nicholas avenue; running thence southerly along the westerly side of St. Nicholas avenue to the point or place of beginning; excepting therefrom the lands occupied by the Brooklyn and Manhattan Beach Railroad Company.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof for the hearing of motions to be held in the County Court-house in the Borough of Brooklyn, in The City of New York, on the 27th day of December, 1904, at the opening of the Court on that day.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 31, 1904.

NORMAN S. DIKE, Chairman;
HUGH MOORE,
LOUIS LA FRANCE,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 031,n17

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening BEVERLY ROAD, from East Thirty-first street to Holy Cross Cemetery, in the Twenty-ninth Ward in the Borough of Brooklyn of The City of New York, as the same has been heretofore laid out.

WE, THE UNDERSIGNED, COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office in the office of the Law Department, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, on or before the 21st day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 23d day of November, 1904, at 2.30 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings of the Law Department of The City of New York, in the Borough of Brooklyn, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, there to remain until the 30th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.: Beginning at a point on the easterly side of East Thirty-first street where the same is intersected by the centre line of the block between Beverley road and Vernon avenue; running thence easterly and along the centre line of the blocks between Beverley road and Vernon avenue to the westerly side of Canarsie avenue; running thence southerly along the westerly side of Canarsie avenue to the centre line of the block between Beverley road and Avenue C; running thence westerly and along the centre line of the blocks between Beverley road and Avenue C to the easterly side of East Thirty-first street; running thence northerly along the easterly side of East Thirty-first street to the point or place of beginning.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof for the hearing of motions, to be held in the County Court-house in the Borough of Brooklyn, in The City of New York, on the 27th day of December, 1904, at the opening of the Court on that day.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 31, 1904.

EDWARD C. DOWLING, Chairman;
BENJAMIN LARZELERE,
DANIEL G. CAMPION,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 031,n17

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening PARK PLACE, from Utica avenue to East New York avenue, in the Twenty-fourth and Twenty-sixth Wards, in the Borough of Brooklyn, of The City of New York, as the same has been heretofore laid out.

WE, THE UNDERSIGNED, COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our amended and supplemental estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office in the office of the Law Department, No. 66 Montague street, in the Borough of Brooklyn, in The City of New York, on or before the 21st day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 22d day of November, 1904, at 3 o'clock P. M.

Second—That the abstract of our said amended and supplemental estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings of the Law Department of The City of New York, in the Borough of Brooklyn, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, there to remain until the 30th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.: Beginning at a point on the easterly side of Utica avenue where the same is intersected by the centre line of the block between Park place and Prospect place; running thence easterly and along the centre line of the block between Park place and Prospect place to the northwesterly side of East New York avenue; running thence southwesterly along the northwesterly side of East New York avenue to the prolongation of the centre line of the block between Sterling place and Park place; running thence westerly and along the centre line of the block between Sterling place and Park place and its prolongation to the easterly side of Utica avenue; running thence northerly along the easterly side of Utica avenue to the point or place of beginning.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof, for the hearing of motions, to be held in the County Court-house in the Borough of Brooklyn, in The City of New York, on the 27th day of December, 1904, at the opening of the Court on that day.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 31, 1904.

GEORGE I. O'KEEFFE, Chairman;
ALEXANDER CAMERON,
ISAAC TUCK,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 031,n17

In the matter of acquiring title by The City of New York to certain lands situate on the NORTHERLY SIDE OF ROBINSON STREET, proposed distance one hundred and fifty feet west of Rogers avenue, in the Borough of Brooklyn, duly selected as a site for school purposes according to law.

WE, THE UNDERSIGNED COMMISSIONers of Estimate in the above-entitled matter, appointed pursuant to the provisions of the statutes relating thereto, hereby give notice to the owner or owners, lessee or lessees, parties or persons respectively entitled to or interested in the lands, tenements, hereditaments and premises, title to which is sought to be acquired in this proceeding, and to all others whom it may concern, to wit:

First—That we have completed our estimate of the loss and damage to the respective owners, lessees parties and persons interested in the lands or premises affected by this proceeding, or having any interest therein, and have filed a true report or transcript of such estimate in the office of the Board of Education of The City of New York, at Park avenue and Fifty-ninth street, in the Borough of Manhattan, City of New York, for the inspection of whomsoever it may concern.

Second—That all parties or persons whose rights may be affected by the said estimate, and who may object to the same, or any part thereof, may within ten days after the first publication of this notice, October 29, 1904, file their objections to such estimate, in writing, with us, at our office, No. 166 Montague street, in the Borough of Brooklyn, in said city, as provided by statute, and that we, the said Commissioners, will hear parties so objecting, at our said office, on the 11th day of November, 1904, at 3 o'clock in the afternoon, and upon such subsequent days as may be found necessary.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 29, 1904.

WILLIAM W. WINGATE,
LOUIS WANKE,
BANCROFT G. BRAINE,
Commissioners.

GEORGE T. RIGGS,
Clerk. 029,n10

In the matter of acquiring title by The City of New York to certain lands and premises situated in the block bounded by HESTER STREET, ELDRIDGE STREET, CANAL STREET AND FORSYTH STREET, in the Borough of Manhattan, in The

City of New York. duly selected as a site for school purposes, according to law.

NOTICE IS HEREBY GIVEN THAT CHARLES W. Dayton, Henry W. Wolf and Moses H. Moses, appointed Commissioners of Estimate and Appraisal herein by an order of the Supreme Court, dated October 14, 1004, and filed in the office of the Clerk of the County of New York, will appear before the Justice of the Supreme Court sitting at Special Term, Part II., in the County Courthouse, in the Borough of Manhattan, in The City of New York, on the 10th day of November, 1904, at 11 o'clock in the forenoon, to be examined by the Corporation Counsel, or by any person interested in this proceeding, as to their qualifications to act as such Commissioners of Estimate and Appraisal.

Dated NEW YORK, October 26, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon Row,
Borough of Manhattan,
City of New York.

028,n9

FIRST DEPARTMENT.

In the matter of the application of the Mayor, Aldermen and Commonalty of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands, tenements and hereditaments required for the purpose of opening and extending WOODLAWN ROAD (although not yet named by proper authority), from Jerome avenue to Bronx Park, as the same has been heretofore laid out and designated as a first-class street or road, in the Twenty-fourth Ward of The City of New York.

NOTICE IS HEREBY GIVEN THAT THE supplemental and additional bill of costs, charges and expenses incurred by reason of the proceedings in the above-entitled matter will be presented for taxation to one of the Justices of the Supreme Court of the State of New York, First Department, at a Special Term thereof, Part I., to be held at the County Court-house, in the Borough of Manhattan, in The City of New York, on the 10th day of November, 1904, at 10.30 o'clock in forenoon of that day, or as soon thereafter as counsel can be heard thereon, and that the said bill of costs, charges and expenses has been deposited in the office of the Clerk of the County of New York, there to remain for and during the space of ten days, as required by the provisions of section 999 of the Greater New York Charter, as amended by chapter 466 of the Laws of 1901.

Dated BOROUGH OF MANHATTAN, NEW YORK, October 28, 1904.

JOHN DEWITT WARNER,
WILLIAM M. LAWRENCE,
WM. H. MCCARTHY,
Commissioners.

JOHN P. DUNN,
Clerk. 028,n7

FIRST DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands, tenements and hereditaments required for the opening and extending of DAWSON STREET (although not yet named by proper authority), from Craven street (East One Hundred and Sixty-fifth street) to Intervale avenue, in the Twenty-third Ward, Borough of The Bronx, City of New York.

NOTICE IS HEREBY GIVEN THAT THE bill of costs, charges and expenses incurred by reason of the proceedings in the above-entitled matter willbe presented for taxation to one of the Justices of the Supreme Court of the State of New York, First Department, at a Special Term thereof, Part I., to be held at the County Court-house, in the Borough of Manhattan, in The City of New York, on the 10th day of November, 1904, at 10.30 o'clock in forenoon of that day, or as soon thereafter as counsel can be heard thereon, and that the said bill of costs, charges and expenses has been deposited in the office of the Clerk of the County of New York, there to remain for and during the space of ten days, as required by the provisions of section 999 of the Greater New York Charter, as amended by chapter 466 of the Laws of 1901.

Dated BOROUGH OF MANHATTAN, NEW YORK, October 28, 1904.

EUGENE M. CAMP,
LOUIS M. EBLING,
THOS. S. MCLAUGHLIN,
Commissioners.

JOHN P. DUNN,
Clerk. 028,n7

FIRST DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands, tenements and hereditaments required for the opening and extending of EAST ONE HUNDRED AND EIGHTY-FIFTH STREET (although not yet named by proper authority), from Washington avenue to Third avenue, in the Twenty-fourth Ward, Borough of The Bronx, City of New York.

NOTICE IS HEREBY GIVEN THAT THE bill of costs, charges and expenses incurred by reason of the proceedings in the above-entitled matter will be presented for taxation to one of the Justices of the Supreme Court of the State of New York, First Department, at a Special Term thereof, Part I., to be held at the County Court-house, in the Borough of Manhattan, in The City of New York, on the 10th day of November, 1904, at 10.30 o'clock in forenoon of that day, or as soon thereafter as counsel can be heard thereon, and that the said bill of costs, charges and expenses has been deposited in the office of the Clerk of the County of New York, there to remain for and during the space of ten days, as required by the provisions of section 999 of the Greater New York Charter, as amended by chapter 466 of the laws of 1901.

Dated BOROUGH OF MANHATTAN, NEW YORK, October 28, 1904.

J. FAIRFAX MCLAUGHLIN, JR.,
HENRY A. COSTER,
CHAS. V. HALLEY,
Commissioners.

JOHN P. DUNN,
Clerk. 028,n7

COUNTY OF RICHMOND.

In the matter of acquiring title by The City of New York to certain lands and premises situated on the NORTHWESTERLY LINE OF DANUBE AVENUE and the SOUTHEASTERLY LINE OF RHINE AVENUE, west of Steuben street, in the Borough of Richmond, in The City of New York, duly selected as a site for school purposes.

NOTICE IS HEREBY GIVEN THAT ALBERT E. Hadlock, Augustus Acker and Charles L. Hubbell, appointed Commissioners of Estimate and Appraisal herein by an order of the Supreme Court, dated October 25, 1904, and filed in the office of the Clerk of the County of Richmond, will appear before the Justice of the Supreme Court, sitting at Special Term, for the hearing of motions, at the County Court-house, in the Borough of Brooklyn, on the 10th day of November, 1904, at 10 o'clock in the forenoon, to be examined by the Corporation Counsel, or by any person interested in this proceeding as to their qualifications to act as such Commissioners of Estimate and Appraisal.

Dated NEW YORK, October 27, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon Row,
Borough of Manhattan,
New York City.

028,n9

COUNTY OF RICHMOND.

In the matter of acquiring title by The City of New York to certain lands and premises situated on the EASTERLY LINE OF CENTRAL AVENUE and the WESTERLY LINE OF STUYVESANT STREET, south of Hyatt street, in the Borough of Richmond, in The City of New York, duly selected as a site for a public library according to law.

NOTICE IS HEREBY GIVEN THAT FREDERick A. Lambert, John G. Clark and James Burke, Jr., appointed Commissioners of Estimate and Appraisal herein by an order of the Supreme Court, dated October 25, 1904 and filed in the office of the Clerk of the County of Richmond, will appear before the Justice of the Supreme Court sitting at Special Term, for the hearing of motions, on the 10th day of November, 1904, at 10 o'clock in the forenoon, to be examined by the Corporation Counsel, or by any person interested in this proceeding as to their qualifications to act as such Commissioners of Estimate and Appraisal.

Dated NEW YORK, October 27, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon Row,
Borough of Manhattan,
New York City.

028,n9

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening NEW YORK AVENUE, from Malbone Street to Church Avenue, in the Twenty-ninth Ward, in the Borough of Brooklyn, of The City of New York, as the same has been heretofore laid out.

WE, THE UNDERSIGNED COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our amended and supplemental estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objection thereto, do present their said objections in writing, duly verified, to us at our office in the office of the Law Department, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, on or before the 17th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 22d day of November, 1904, at 10 o'clock A. M.

Second—That the abstract of our said amended and supplemental estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings of the Law Department of The City of New York, in the Borough of Brooklyn, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, there to remain until the 28th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.: Beginning at a point on the southerly side of Malbone street and distant two hundred and seventy-five (275) feet easterly of the easterly side of New York avenue; running thence southerly and parallel with New York avenue to the northerly side of Church avenue; running thence westerly and along the northerly side of Church avenue to a point distant two hundred and seventy-five (275) feet westerly of the westerly side of New York avenue; running thence northerly and parallel with New York avenue to the southerly side of Malbone street; running thence easterly and along the southerly side of Malbone street to the point or place of beginning.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 27th day of December, 1904, at the opening of the Court on that day.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 28, 1004.

FRANK GALLAGHER, Chairman,
WM. H. SMITH,
WILLIAM P. LEGGETT, JR.,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 028, n15

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening NINTH AVENUE, from Thirty-seventh street to Bay Ridge avenue, in the Eighth and Thirtieth Wards, in the Borough of Brooklyn, of The City of New York, as the same has been heretofore laid out.

WE, THE UNDERSIGNED COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office, in the office of the Law Department, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, on or before the 17th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 23d day of November, 1904, at 10 o'clock A. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings of the Law Department of The City of New York, in the Borough of Brooklyn, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, there to remain until the 28th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.: Beginning at a point on the southerly side of Thirty-seventh street where the same is intersected by the centre line of the block between Ninth avenue and Tenth avenue; running thence southerly and parallel with Ninth avenue to the northerly side of Bay Ridge avenue; running thence westerly and along the northerly side of Bay Ridge avenue to the centre line of the block between Ninth avenue and Eighth avenue; running thence northerly and along the centre line of the blocks between Ninth avenue and Eighth avenue to the southerly side of Thirty-seventh street; running thence easterly along the southerly side of Thirty-seventh street to the point or place of beginning.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof, for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 27th day of December, 1904, at the opening of the Court on that day.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 28, 1904.

JOSEPH A. GUIDER,
Chairman;
EUGENE V. DALY,
HENRY JOSEPH,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 028,n15

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening EAST NINETY-FOURTH STREET, between Sea View avenue and East New York avenue, in the Twenty-ninth and Thirty-second Wards, in the Borough of Brooklyn, of The City of New York, as the same has been heretofore laid out.

WE, THE UNDERSIGNED, COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objection thereto, do present their said objections in writing, duly verified, to us, at our office, in the office of the Law Department, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, on or before the 17th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 18th day of November, 1904, at 10 o'clock A. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings of the Law Department of The City of New York, in the Borough of Brooklyn, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, there to remain until the 28th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.: Beginning at a point on the southerly side of East New York avenue where the same is intersected by the centre line of the block between East Ninety-fourth street and East Ninety-fifth street; running thence southerly and along the centre line of the blocks between East Ninety-fourth street and East Ninety-fifth street to the northerly side of Sea View avenue; running thence westerly along the northerly side of Sea View avenue to the centre line of the block between East Ninety-third street and East Ninety-fourth street; running thence northerly and along the centre line of the blocks between East Ninety-third street and East Ninety-fourth street to the southerly side of East New York avenue; running thence easterly along the southerly side of East New York avenue to the point or place of beginning.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof, for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 27th day of December, 1904, at the opening of the Court on that day.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 28, 1904.

FRANCIS H. KENNY, Chairman;
JAMES J. MCINERNEY,
HERSEY EGGINTON,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 028,n15

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening EIGHTIETH STREET, from Narrows avenue to Fourteenth avenue, in the Thirtieth Ward, in the Borough of Brooklyn, of The City of New York, as the same has been heretofore laid out.

WE, THE UNDERSIGNED, COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office, in the office of the Law Department, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, on or before the 17th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 21st day of November, 1904, at 10 o'clock A. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings of the Law Department of The City of New York, in the Borough of Brooklyn, No. 166 Montague street, in the Borough of Brooklyn, in The City of New York, there to remain until the 28th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Brooklyn, in The City of New York, which, taken together, are bounded and described as follows, viz.: Beginning at a point on the easterly side of Narrows avenue where the same is intersected by the centre line of the block between Eightieth street and Seventy-ninth street; running thence easterly and along the centre line of the blocks between Eightieth street and Seventy-ninth street to a point distant one hundred feet easterly of the easterly side of Fourteenth avenue; running thence southerly and parallel with Fourteenth avenue to the centre line of the block between Eightieth street and Eighty-first street; running thence westerly and along the centre line of the blocks between Eightieth street and Eighty-first street to the easterly side of Narrows avenue; running thence northerly along the easterly side of Narrows avenue to the point or place of beginning.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof, for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 27th day of December, 1904, at the opening of the Court on that day.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 28, 1904.

THOMAS H. TROY, Chairman;
JOSEPH A. GARDINER,
VICTOR A. ROBERTSON,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 028,n15

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands and premises required for the opening and extending of BLACKWELL STREET (although not yet named by proper authority), from Jackson avenue to Graham avenue, in the First Ward of the Borough of Queens in the City of New York.

WE, THE UNDERSIGNED, COMMISSIONers of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us, at our office, in the Borough of Queens, in The City of New York, on or before the 9th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 11th day of November, 1904, at 4 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings in the Law Department of The City of New York, No. 252 Jackson avenue, in the Borough of Queens, in said City, there to remain until the 19th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Queens, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point on the northerly side of Jackson avenue at the middle of the block between Blackwell street and Pomeroy street; running thence in a northerly direction along the centre line of the block between Blackwell street and Pomeroy street to the southerly side of Graham avenue; thence westerly along the southerly side of Graham avenue to a point at the centre of the block between Blackwell street and Bartow street; thence southerly along the centre line of the block between Blackwell street and Bartow street to the northerly side of Jackson avenue; thence easterly along the northerly side of Jackson avenue to the point or place of beginning; excepting from said area all streets, avenues and roads or portions thereof heretofore legally opened as such area is shown upon our benefit maps deposited as aforesaid.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof, for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 19th day of January, 1905, at the opening of the Court on that day.

Dated BOROUGH OF MANHATTAN, NEW YORK, June 14, 1904.

JOS. FITCH, Chairman;
MORTIMER S. BROWN,
JAMES M. SEAMAN,
Commissioners.

JOHN P. DUNN,
Clerk. 019,n5

FIRST JUDICIAL DISTRICT.

In the matter of the application of The City of New York, acting by and through the Commissioner of Docks, relative to acquiring right and title to and possession of the wharfage rights, terms, easements, emoluments and privileges APPURTENANT TO PIERS, OLD NOS. 16 AND 17, EAST RIVER, in the Borough of Manhattan, City of New York, not now owned by The City of New York, and all right, title and interest in and to said piers or any portion thereof not now owned by The City of New York, and all wharfage rights, terms, easements, emoluments and privileges appurtenant to all that certain bulkhead, dock or wharf property on or near the southerly line of South street, in said Borough and City, between the easterly side of Pier, old No. 16, and the westerly side of Pier, old No. 17, and between the easterly side of Pier, old No. 17, and the westerly side of Pier, old No. 18, East river, not now owned by The City of New York, for the improvement of the water front of The City of New York on the East river, pursuant to the plan heretofore adopted by the Board of Docks and approved by the Commissioners of the Sinking Fund.

PURSUANT TO THE STATUTES IN such case made and provided, notice is hereby given that an application will be made to a Special Term of the Supreme Court of the State of New York in and for the First Judicial District, to be held in Part III. thereof at the County Court-house in The City of New York, Borough of Manhattan, on the 10th day of November, 1904, at the opening of the Court on that day, or as soon thereafter as counsel can be heard thereon, for the appointment of Commissioners of Estimate and Assessment in the above-entitled matter.

The nature and extent of the improvement hereby intended is the acquisition, in the name of and for the benefit of The City of New York, for the execution of a certain plan for the improvement of the water front of The City of New York, pursuant to the satutes in such case made and provided, and determined upon by the Board of Docks on the 13th day of April, 1871, and approved by the Commissioners of the Sinking Fund on the 27th day of April, 1871, as altered and amended by the Board of Docks on the 26th day of October, 1900, which alteration and amendment was approved by the Commissioners of the Sinking Fund on the 14th day of

November, 1900, and which said plan and alteration and amendment thereof are on file in the office of the Department of Docks and Ferries, of all the wharfage, rights, terms, easements, emoluments and privileges not now owned by The City of New York and appurtenant to the following-described piers and bulkheads situated on the East river, Borough of Manhattan, City of New York, viz.:

PARCEL "A."

Pier, old No. 16, or Wall Street Pier, East, bounded and described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street where the westerly side of said Pier, Old No. 16, intersects the same, said point being distant 15 feet westerly along said bulkhead from a point where the southerly prolongation of the easterly line of Wall street would intersect the same, and running thence easterly along the inner or northerly end of said pier and along the bulkhead in the rear of the same 41.5 feet to the easterly side of said pier.

Thence southerly and along the easterly side of said pier 376 feet to an angle in the said easterly side.

Thence deflecting to the right and continuing still along the easterly side of said pier 116 feet to the outer or southerly end of said pier.

Thence westerly and along the outer end of said pier 46.8 feet to the westerly side of said pier.

Thence northerly and along the westerly side of said pier in six courses, as follows:

First, 55 feet to an angle in said westerly side.

Thence deflecting to the left and running 57 feet to an angle in said westerly side.

Thence deflecting to the left and running 38 feet to an angle in said westerly side.

Thence deflecting to the left and running 28 feet to an angle in said westerly side.

Thence deflecting to the right and running 180 feet to an angle in said westerly side.

Thence deflecting to the right and running 124 feet along said westerly side of Pier, old No. 16, to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "B."

Pier, old No. 17, or Pine Street Pier, bounded and described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street where it intersects the westerly side of Pier, old No. 17, or Pine Street Pier, said point being distant 4 feet easterly from a point in said bulkhead where the southerly prolongation of the westerly line of Pine street intersects the same, and running thence easterly along the inner or northerly end of said Pier, old No. 17, and along the bulkhead in the rear of the same 30.5 feet to the easterly side of said pier.

Thence southerly and along the easterly side of said pier 119 feet to an angle in said easterly side.

Thence deflecting to the right and running still along said easterly side 220 feet to an angle in said easterly side.

Thence deflecting to the right and running still along said easterly side 126 feet to the outer or southerly end of said pier.

Thence westerly and along the southerly end of said pier 36.6 feet to the westerly side of said pier.

Thence northerly and along said westerly side of said pier 469 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "C."

The bulkhead, dock or wharf property between Pier, old No. 16, or Wall Street Pier, East, and Pier, old No. 17, or Pine Street Pier, described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street at its intersection with the westerly line of Pier, old No. 17, distant 4 feet easterly from a point in said bulkhead where the southerly prolongation of the westerly line of Pine street intersects the same, and running thence westerly and along said bulkhead 182 feet to the easterly side of said Pier, old No. 16, or Wall Street Pier, East.

PARCEL "D."

The bulkhead, dock or wharf property between Pier, old No. 17, or Pine Street Pier, and Pier No. 18, or Maiden Lane Pier, West, described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street at its intersection with the easterly side of Pier, old No. 17, or Pine Street Pier, said point being distant 34.5 feet easterly from a point in said bulkhead where the southerly prolongation of the westerly line of Pine street intersects the same, and running thence easterly and along said bulkhead 130.25 feet to the westerly side of Pier, old No. 18, or Maiden Lane Pier, West.

Dated NEW YORK, October 26, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon row,
Borough of Manhattan,
New York City.

027n7

FIRST JUDICIAL DISTRICT.

In the matter of the application of The City of New York, acting by and through the Commissioner of Docks, relative to acquiring right and title to and possession of the wharfage rights, terms, easements, emoluments and privileges APPURTENANT TO PIERS, OLD NOS. 9 AND 10, EAST RIVER, in the Borough of Manhattan, City of New York, not now owned by The City of New York, and all right, title and interest in and to said piers or any portion thereof not now owned by The City of New York, and all wharfage rights, terms, easements, emoluments and privileges appurtenant to all that certain bulkhead, dock or wharf property on or near the southerly line of South street, in said Borough and City, between the easterly side of Pier No. 7 and the westerly side of Pier, old No. 9, and between the easterly side of Pier, old No. 9, and the westerly side of Pier, old No. 10, and appurtenant to the westerly one-half part of the bulkhead, dock or wharf property between the easterly side of Pier, old No. 10, and the westerly side of Pier, old No. 11, East river, not now owned by The City of New York, for the improvement of the water front of The City of New York on the East river, pursuant to the plan heretofore adopted by the Board of Docks and approved by the Commissioners of the Sinking Fund.

PURSUANT TO THE STATUTES IN such case made and provided, notice is hereby given that an application will be made to a Special Term of the Supreme Court of the State of New York in and for the First Judicial District, to be held in Part III. thereof at the County Court-house in The City of New York, Borough of Manhattan, on the 10th day of November, 1904, at the opening of the court on that day, or as soon thereafter as counsel can be heard thereon, for the appointment of Commissioners of Estimate and Assessment in the above entitled matter.

The nature and extent of the improvement hereby intended is the acquisition in the name of and for the benefit of The City of New York for the execution of a certain plan for the improvement of the water front of The City of New York, pursuant to the statutes in such case made and provided and determined upon by the Board of Docks on the 13th day of April, 1871, and approved by the Commissioners of the Sinking Fund on the 27th day of April, 1871, as altered and amended by the Board of Docks on the 26th day of October, 1900, which alteration and amendment was approved by the Commissioners of the Sinking Fund on the 14th day of November, 1900, and which said plan and alteration and amendment thereof are on file in the office of the Department of Docks and Ferries, of all the wharfage rights, terms, easements, emoluments and privileges not now owned by The City of New York and appurtenant to the following described piers and bulkheads situated on the East river, in the Borough of Manhattan, City of New York, viz.:

PARCEL "A."

Pier, old No. 9, or Coenties Slip Pier, East, near the foot of Cuyler's alley, bounded and described as follows:

Beginning at a point in the old bulkhead in the vicinity of the southerly side of South street where the westerly side of Pier, old No. 9, or Coenties Slip Pier, East, intersects said bulkhead, the northerly prolongation of said westerly side intersecting the northerly line of South street at a point distant 97.5 feet easterly from the easterly corner of Coenties slip, and running thence easterly along the inner end of and along the bulkhead in the rear of said Pier, old No. 9, to the easterly side of said pier; thence southerly along the easterly side of said Pier, old No. 9, 476.7 feet to the southerly or outer end of said pier; thence westerly and along the outer end of said pier 40 feet to the westerly side of said Pier, old No. 9; thence northerly and along said westerly side 483.95 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "B."

Pier, old No. 10, or Old Slip Pier, West, bounded and described as follows:

Beginning at a point in the present bulkhead between Cuyler's alley and Old slip, distant 67.6 feet, more or less, easterly from a point in the present bulkhead where the southerly prolongation of the easterly line of Cuyler's alley intersects the same, and running thence easterly and along the northerly or inshore end of said Pier, old No. 10, and the bulkhead in the rear of the same 35 feet to the easterly line of said Pier, old No. 10, as it existed before widening; thence southerly along said easterly line which is parallel with and 5 feet westerly from the present easterly line of said Pier, old No. 10, 462.67 feet to the southerly or outer end of said pier; thence westerly and along the outer end of said pier 35 feet to the westerly side of said pier; thence northerly and along said westerly side 466 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "C."

The bulkhead, dock or wharf property between Pier No. 7 at the foot of Coenties slip and Pier, old No. 9, or Coenties Slip Pier, East, extending along the southerly line of South street from the easterly side of said Pier No. 7 100.74 feet easterly to the westerly side of said Pier, old No. 9; the northerly prolongation of the westerly side of said Pier, old No. 9, intersecting the northerly line of South street at a point distant 97.5 feet easterly from the easterly corner of Coenties slip.

PARCEL "D."

The bulkhead, dock or wharf property between Piers, old No. 9, or Coenties Slip Pier, East, and old No. 10, or Old Slip Pier, West, extending with a length of 102.6 feet, more or less, along the present bulkhead in the vicinity of the southerly line of South street, from the easterly side of said Pier, old No. 9, easterly to the westerly side of said Pier, old No. 10; the northerly prolongation of said easterly side of said Pier, old No. 9, intersecting the northerly line of South street at a point distant 136.5 feet easterly from the easterly corner of Coenties slip.

PARCEL "E."

The westerly one-half part of the bulkhead, dock or wharf property between Piers, old No. 10, and old No. 11, East river, described as follows:

Beginning at a point in the present bulkhead where the easterly line of Pier, old No. 10, or Old Slip Pier, West, as it existed before widening, intersects the same, said point being distant 102.6 feet, more or less, easterly from a point in the bulkhead where the southerly prolongation of the easterly line of Cuyler's alley intersects the same, and running thence easterly along the present bulkhead 109.3 feet to the westerly side of Pier, old No. 11, or Old Slip Pier.

Dated NEW YORK, October 26, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon row,
Borough of Manhattan,
City of New York.

027n7

FIRST JUDICIAL DISTRICT.

In the matter of the application of The City of New York, acting by and through the Commissioner of Docks, relative to acquiring right and title to and possession of the wharfage rights, terms, easements, emoluments and privileges APPURTENANT TO PIERS, OLD NOS. 19 AND 20, EAST RIVER, in the Borough of Manhattan, City of New York, not now owned by The City of New York, and all right, title and interest in and to said piers or any portion thereof, not now owned by The City of New York, and all wharfage rights, terms, easements, emoluments and privileges appurtenant to all that certain bulkhead, dock or wharf property on or near the southerly side of South street, in said Borough and City, between the easterly side of Pier, old No. 19, and the westerly side of Pier, old No. 20, East river, not now owned by The City of New York, for the improvement of the water-front of The City of New York on the East river, pursuant to the plan heretofore adopted by the Board of Docks and approved by the Commissioners of the Sinking Fund.

PURSUANT TO THE STATUTES IN such case made and provided, notice is hereby given that an application will be made to a Special Term of the Supreme Court of the State of New York in and for the First Judicial District, to be held in Part III. thereof at the County Court-house in The City of New York, Borough of Manhattan, on the 10th day of November, 1904, at the opening of the court on that day or as soon thereafter as counsel can be heard thereon, for the appointment of Commissioners of Estimate and Assessment in the above entitled matter.

The nature and extent of the improvement hereby intended is the acquisition, in the name of and for the benefit of The City of New York, for the execution of a certain plan for the improvement of the water-front of The City of New York, pursuant to the statutes in such case made and provided, and determined upon by the Board of Docks on the 13th day of April, 1871, and approved by the Commissioners of the Sinking Fund on the 27th day of April, 1871, as altered and amended by the Board of Docks on the 26th day of October, 1900, which alteration and amendment was approved by the Commissioners of the Sinking Fund on the 14th day of November, 1900, and which said plan and alteration and amendment thereof are on file in the office of the Department of Docks and Ferries, of all the wharfage rights, terms, easements, emoluments and privileges not now owned by The City of New York and appurtenant to the following described piers and bulkheads situated on the East river, Borough of Manhattan, City of New York, viz.:

PARCEL "A."

Pier, old No. 19, or Maiden Lane Pier, East, bounded and described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street where it intersects the easterly side of Pier, old No. 19, or Maiden Lane Pier, East, said point being 20 feet easterly from a point in said bulkhead where the southerly prolongation of the westerly line of Fletcher street intersects the same, and running thence southerly and along the easterly side of the said pier 441.4 feet to the outer or southerly end of said pier;

Thence westerly and along the southerly end of said pier 40 feet to the westerly side of said pier;

Thence northerly and along the westerly side of said pier 440.8 feet to the inner or northerly end of said pier;

Thence easterly and along the northerly end of said pier and along the bulkhead in the rear of the same 31 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "B."

Pier, old No. 20, or Burling Slip Pier, West, bounded and described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street at its intersection with the easterly side of said Pier, old No. 20, said point being in the southerly prolongation of the westerly line of Burling slip, and running thence southerly and along the easterly side of said Pier, old No. 20, 438.4 feet to the outer or southerly end of said pier;

Thence westerly and along the outer end of said pier 40 feet to the westerly side of said pier;

Thence northerly and along the westerly side of said pier 435.3 feet to the present bulkhead at the inner or northerly end of said pier;

Thence easterly and along the northerly end of said pier and along the bulkhead in the rear of the same 40 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "C."

The bulkhead, dock or wharf property between Pier, old No. 19, or Maiden Lane Pier, East, and Pier, old No. 20, or Burling Slip Pier, West, are described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street at its intersection with the westerly side of Pier, old No. 20, said point being distant 40 feet westerly from a point in said bulkhead where the southerly prolongation of the westerly line of Burling slip intersects the same, and running thence westerly along said bulkhead 136 feet to the easterly side of said Pier, old No. 19, or Maiden Lane Pier, East.

Dated NEW YORK, October 26, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon row,
Borough of Manhattan,
New York City.

027n7

FIRST JUDICIAL DISTRICT.

In the matter of the application of The City of New York, acting by and through the Commissioner of Docks, relative to acquiring right and title to and possession of the wharfage rights, terms, easements, emoluments and privileges APPURTENANT TO PIER, OLD NO. 11, EAST RIVER, in the Borough of Manhattan, City of New York, not now owned by The City of New York, and all right, title and interest in and to said Pier or any portion thereof not now owned by The City of New York, and all wharfage, rights, terms, easements, emoluments and privileges appurtenant to the easterly one-half part of all that certain bulkhead, dock or wharf property on or near the southerly line of South street in said Borough and City, between the easterly side of Pier, old No. 10, and the westerly side of Pier, old No. 11, East river, not now owned by The City of New York, for the improvement of the water front of The City of New York on the East river, pursuant to the plan heretofore adopted by the Board of Docks and approved by the Commissioners of the Sinking Fund.

PURSUANT TO THE STATUTES IN such case made and provided, notice is hereby given that an application will be made to a Special Term of the Supreme Court of the State of New York in and for the First Judicial District, to be held in Part III. thereof, at the County Court-house in The City of New York, Borough of Manhattan, on the 10th day of November, 1904, at the opening of the Court on that day, or as soon thereafter as counsel can be heard thereon, for the appointment of Commissioners of Estimate and Assessment in the above-entitled matter.

The nature and extent of the improvement hereby intended is the acquisition, in the name of and for the benefit of The City of New York, for the execution of a certain plan for the improvement of the water front of The City of New York, pursuant to the statutes in such case made and provided, and determined upon by the Board of Docks on the 13th day of April, 1871, and approved by the Commissioners of the Sinking Fund on the 27th day of April, 1871, as altered and amended by the Board of Docks on the 3d day of November, 1899, which alteration and amendment was approved by the Commissioners of the Sinking Fund on the 6th day of December, 1899, and which said plan and alteration and amendment thereof are on file in the office of the Department of Docks and Ferries, of all the wharfage rights, terms, easements, emoluments and privileges not now owned by The City of New York and appurtenant to the following-described pier and bulkheads situated on the East river, Borough of Manhattan, City of New York, viz.:

PARCEL "A."

Pier, old No. 11, or Old Slip Pier, at the foot of Old slip, bounded and described as follows:

Beginning at a point where the westerly side of said Pier, old No. 11, intersects the present bulkhead, said point being distant 211.9 feet easterly from a point where the southerly prolongation of the easterly line of Cuyler's alley would intersect the bulkhead along the southerly line of South street, and running thence easterly along the northerly or inshore end of said Pier, old No. 11, and along the bulkhead in the rear of the same, on three courses: First, 6 feet; then southerly in a line parallel with the westerly side of said pier 11 feet, then easterly 26 feet to the easterly side of said Pier, old No. 11.

Thence southerly and along the easterly side of said pier 23.1 feet.

Thence easterly along an offset in the easterly side of said pier 2 feet.

Thence southerly and still along the easterly side of said pier 433 feet to the southerly or outer end of said pier.

Thence westerly and along the southerly end of said pier 37 feet to the westerly side of said pier.

Thence northerly along the westerly side of said Pier, old No. 11, 469.5 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "B."

The easterly one-half part of the bulkhead, dock or wharf property between Piers, old No. 10, and old No. 11, E. R., described as follows:

Beginning at a point in the present bulkhead where the easterly line of Pier, old No. 10, or Old Slip Pier, West, as it existed before widening, intersects the same, said point being distant 102.6 feet, more or less, easterly from a point in the bulkhead where the southerly prolongation of the easterly line of Cuyler's alley intersects the same, and running thence easterly along the present bulkhead 109.3 feet to the westerly side of Pier, old No. 11, or Old Slip Pier.

Dated NEW YORK, October 26, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon row,
Borough of Manhattan,
New York City.

027n7

FIRST JUDICIAL DISTRICT.

In the matter of the application of The City of New York, acting by and through the Commissioner of Docks, relative to acquiring right and title to and possession of the wharfage rights, terms, easements, emoluments and privileges APPURTENANT TO PIER, OLD NO. 13, EAST RIVER, in the Borough of Manhattan, City of New York, not now owned by The City of New York, and all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York, and all wharfage rights, terms, easements, emoluments and privileges appurtenant to all that certain bulkhead, dock or wharf property on or near the southerly line of South street, in said Borough and City, between the easterly side of Pier, old No. 12, and the westerly side of Pier, old No. 13, and appurtenant to the westerly one-half part of the bulkhead dock or wharf property between the easterly side of Pier, old No. 13, and the westerly side of Pier, old No. 14, East river, not now owned by The City of New York for the improvement of the water front of The City of New York on the East river, pursuant to the plan heretofore adopted by the Board of Docks and approved by the Commissioners of the Sinking Fund.

PURSUANT TO THE STATUTES IN such case made and provided, notice is hereby given that an application will be made to a Special Term of the Supreme Court of the State of New York in and for the First Judicial District, to be held in Part III. thereof, at the County Court-house in The City of New York, Borough of Manhattan, on the 10th day of November, 1904, at the opening of the Court on that day, or as soon thereafter as counsel can be heard thereon, for the appointment of Commissioners of Estimate and Assessment in the above-entitled matter.

The nature and extent of the improvement hereby intended is the acquisition, in the name of and for the benefit of The City of New York, for the execution of a certain plan for the improvement of the water front of The City of New York, pursuant to the statutes in such case made and provided, and determined upon by the Board of Docks on the 13th day of April, 1871, and approved by the Commissioners of the Sinking Fund on the 27th day of April, 1871, as altered and amended by the Board of Docks on the 3d day of November, 1899, which alteration and amendment was approved by the Commissioners of the Sinking Fund on the 6th day of December, 1899, and which said plan and alteration and amendment thereof are on file in the office of the Department of Docks and Ferries, of all the wharfage rights, terms, easements, emoluments and privileges not now owned by The City of New York and appurtenant to the following-described pier and bulkheads situated on the East river, Borough of Manhattan, City of New York, viz.:

PARCEL "A."

Pier, old No. 13, or Gouverneur Lane Pier, bounded and described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street, where the easterly side of Pier, old 13, or Gouverneur Lane Pier, intersects the same, said point being distant 31 feet westerly along said bulkhead from a point where the southerly prolongation of the westerly line of Gouverneur lane would intersect the same, and running thence southerly along the easterly side of said Pier, old No. 13, 430 feet to the southerly or outer end of said pier.

Thence westerly and along the outer end of said pier 23 feet to the westerly side of said pier.

Thence northerly and along the westerly side of said pier 15 feet to an angle in said westerly side.

Thence deflecting to the right and continuing still along the westerly side of said pier 91 feet to an angle in the westerly side of said pier.

Thence deflecting to the right and continuing still along the westerly side of said pier 324 feet to the inner or northerly end of said pier at the present bulkhead.

Thence easterly and along the northerly end of said pier and along the bulkhead in the rear of the same 32 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "B."

The bulkhead, dock or wharf property between Piers, old No. 12 and old No. 13, E. R., bounded and described as follows:

Beginning at a point in the present bulkhead where the westerly line of Pier, old 13, or Gouverneur Lane Pier, intersects the same, said point being distant 63 feet westerly from a point in said bulkhead where the southerly prolongation of the westerly line of Gouverneur lane intersects the same, and running thence westerly

and along said bulkhead 123.8 feet to the easterly side of Pier, old No. 12, E. R., near the foot of Old slip.

PARCEL "C."

The westerly one-half part of the bulkhead, dock or wharf property between Piers, old No. 13 and old No. 14, described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street where the easterly line of Pier, old No. 13, or Gouverneur Lane Pier, intersects the same, said point being distant 31 feet westerly from a point in said bulkhead where the southerly prolongation of the westerly line of Gouverneur lane would intersect the same, and running thence easterly and along said bulkhead 127.43 feet to the westerly side of Pier, old No. 14, or Wall Street Pier, West.

Dated NEW YORK, October 26, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon Row,
Borough of Manhattan,
New York City.

027n7

FIRST JUDICIAL DISTRICT.

In the matter of the application of The City of New York, acting by and through the Commissioner of Docks, relative to acquiring right and title to and possession of the wharfage rights, terms, easements, emoluments and privileges APPURTENANT TO PIER, OLD NO. 14, EAST RIVER, in the Borough of Manhattan, City of New York, not now owned by The City of New York, and all right, title and interest in and to said pier, or any portion thereof not now owned by The City of New York, and all wharfage rights, terms, easements, emoluments and privileges appurtenant to the easterly one-half part of all that certain bulkhead, dock or wharf property on or near the southerly line of South street, in said Borough and City, between the easterly side of Pier, old No. 13, and the westerly side of Pier, old No. 14, and appurtenant to all that certain bulkhead, dock or wharf property between the easterly side of Pier, old No. 14, and Pier, new No. 12, or Wall Street Pier, East river, not now owned by The City of New York, for the improvement of the water-front of The City of New York on the East river, pursuant to the plan heretofore adopted by the Board of Docks and approved by the Commissioners of the Sinking Fund.

PURSUANT TO THE STATUTES IN such case made and provided, notice is hereby given that an application will be made to a Special Term of the Supreme Court of the State of New York in and for the First Judicial District, to be held in Part III. thereof at the County Court-house, in The City of New York, Borough of Manhattan, on the 10th day of November, 1904, at the opening of the court on that day, or as soon thereafter as counsel can be heard thereon, for the appointment of Commissioners of Estimate and Assessment in the above entitled matter.

The nature and extent of the improvement hereby intended is the acquisition, in the name of and for the benefit of The City of New York, for the execution of a certain plan for the improvement of the water front of The City of New York, pursuant to the statutes in such case made and provided, and determined upon by the Board of Docks on the 13th day of April, 1871, and approved by the Commissioners of the Sinking Fund on the 27th day of April, 1871, as altered and amended by the Board of Docks on the 3d day of November, 1899, which alteration and amendment was approved by the Commissioners of the Sinking Fund on the 6th day of December, 1899, and which said plan and alteration and amendment thereof are on file in the office of the Department of Docks and Ferries, of all the wharfage rights, terms, easements, emoluments and privileges not now owned by The City of New York and appurtenant to the following described pier and bulkheads situated on the East river, Borough of Manhattan, City of New York, viz.:

PARCEL "A."

Pier, old No. 14, or Wall Street Pier, West, at the foot of Jones lane and bounded and described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street where the easterly side of said Pier, old No. 14, intersects the same, said point being distant 130.63 feet easterly from a point in said bulkhead where the southerly prolongation of the westerly line of Gouverneur lane would intersect the same, and running thence southerly along the easterly side of said Pier, old No. 14, 436.65 feet to the southerly or outer end of said pier;

Thence westerly and along the southerly or outer end of said pier 38.4 feet to the westerly side of said pier;

Thence northerly and along the westerly side of said pier 434.03 feet to the bulkhead at the inner or northerly end of said pier;

Thence easterly and along the inner or northerly end of said pier and along the bulkhead in the rear of the same 34.2 feet to the point or place of beginning.

Together with all right, title and interest in and to said pier or any portion thereof not now owned by The City of New York.

PARCEL "B."

The easterly one-half part of the bulkhead, dock or wharf property between Piers, old No. 13, and old No. 14, described as follows:

Beginning at a point in the present bulkhead in the vicinity of the southerly line of South street where the easterly line of Pier, old No. 13, or Gouverneur Lane Pier, intersects the same, said point being distant 31 feet westerly from a point in said bulkhead where the southerly prolongation of the westerly line of Gouverneur lane would intersect the same, and running thence easterly and along said bulkhead 127.43 feet to the westerly side of Pier, old No. 14, or Wall Street Pier, West.

PARCEL "C."

The bulkhead, dock or wharf property between Piers, old No. 14, or Wall Street Pier, West, and Pier, new No. 12, or Wall Street Pier, described as follows:

Beginning at a point in the present bulkhead at the easterly side of said Pier, old 14, said point being distant 130.63 feet easterly from that point in said bulkhead where the southerly prolongation of the westerly line of Gouverneur lane would intersect the same, and running thence northerly in the prolongation of the easterly side of said Pier, old No. 14, 4.7 feet;

Thence easterly and along the present bulkhead 98 feet;

Thence northerly and still along the present bulkhead 16 feet;

Thence easterly and still along the present bulkhead 22.2 feet to the westerly side of Pier, old No. 15, as it formerly existed at the foot of Wall street.

Dated NEW YORK, October 26, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon row,
Borough of Manhattan,
New York City.

027n9

FIRST DEPARTMENT.

In the matter of the application of the Mayor, Aldermen and Commonalty of The City of New York, for the appointment of Commissioners of Appraisal, under chapter 114 of the Laws of 1892, passed March 9, 1892, entitled "An Act to provide for settling and establishing permanently the location and boundaries of the avenue known as FORT WASHINGTON RIDGE ROAD, in The City of New York, and in relation to the improvement thereof."

NOTICE IS HEREBY GIVEN, PURSUANT to the provisions of section 14 of chapter 114 of the Laws of 1892:

First—That the report of the Commissioners of Appraisal in the above entitled matter was confirmed by an order of the Supreme Court, Special Term, Part III., of the State of New York, bearing date the 7th day of July, 1904, and entered in the office of the Clerk of the County of New York on the 12th day of July, 1904, and said report is now on file in the office of the Clerk of the County of New York.

Second—That the said report contains the awards to be made for the real estate required for Fort Washington Ridge Road, as said road has been settled, adjusted, determined and established by the Commissioners appointed under section 2, chapter 114 of the Laws of 1892.

Third—That the said report contains a brief description of the parcels of such real estate subdivided in accordance with the ownership thereof, so far as the same could be ascertained by the Commissioners.

Fourth—That a description of the said real estate is contained in the petition of the Mayor, Aldermen and Commonalty of The City of New York, for the appointment of Commissioners of Appraisal, under chapter 114 of the Laws of 1892, passed March 9, 1892, entitled "An act to provide for settling and establishing permanently the location and boundaries of the avenue known as Fort Washington Ridge Road, in The City of New York, and in relation to the improvement thereof," which petition was filed in the office of the Clerk of the County of New York, together with the order appointing the Commissioners of Appraisal herein on the 9th day of May, 1893.

Fifth—That the real estate acquired for the improvement is subdivided in the report of the Commissioners and is shown and described on the maps of damage which form a part of and are attached to said report, as follows:

Parcel Number 1, in testimony Parcel Number 1.
Parcel Number 2-A, in testimony Parcel Number 2.
Parcel Number 2-B, in testimony Parcel Number 3.
Parcel Number 2-C, in testimony Parcel Number 4.
Parcel Number 2-D, in testimony Parcel Number 5.
Parcel Number 2-E, in testimony Parcel Number 6.
Parcel Number 2-F, in testimony Parcel Number 7.
Parcel Number 2-G, in testimony Parcel Number 8.
Parcel Number 2-H, in testimony Parcel Number 9.
Parcel Number 3-A, in testimony Parcel Number 10.
Parcel Number 3-B, in testimony Parcel Number 11.
Parcel Number 3-C, in testimony Parcel Number 12.
Parcel Number 3-D, in testimony Parcel Number 13.
Parcel Number 3-E, in testimony Parcel Number 14.
Parcel Number 4-A, in testimony Parcel Number 15.
Parcel Number 4-B, in testimony Parcel Number 16.
Parcel Number 4-C, in testimony Parcel Number 17.
Parcel Number 4-D, in testimony Parcel Number 18.
Parcel Number 4-E, in testimony Parcel Number 19.
Parcel Number 4-F, in testimony Parcel Number 20.
Parcel Number 5-A, in testimony Parcel Number 21.
Parcel Number 5-B, in testimony Parcel Number 22.
Parcel Number 6-A, in testimony Parcel Number 23.
Parcel Number 6-B, in testimony Parcel Number 24.
Parcel Number 6-C, in testimony Parcel Number 25.
Parcel Number 7, in testimony Parcel Number 26.
Parcel Number 8-A, in testimony Parcel Number 26.
Parcel Number 8-B, in testimony Parcel Number 27.
Parcel Number 8-C, in testimony Parcel Number 28.
Parcel Number 9-A, in testimony Parcel Number 28.
Parcel Number 9-B, in testimony Parcel Number 29.
Parcel Number 9-C, in testimony Parcel Number 29.
Parcel Number 9-D, in testimony Parcel Number 30.
Parcel Number 9-E, in testimony Parcel Number 30.
Parcel Number 9-F, in testimony Parcel Number 31.
Parcel Number 9-G, in testimony Parcel Number 32.
Parcel Number 9-H, in testimony Parcel Number 33.
Parcel Number 9-I, in testimony Parcel Number 34.
Parcel Number 9-J, in testimony Parcel Number 35.
Parcel Number 9-K, in testimony Parcel Number 36.
Parcel Number 10-A, in testimony Parcel Number 37.
Parcel Number 11-A, in testimony Parcel Number 38.
Parcel Number 11-B, in testimony Parcel Number 39.
Parcel Number 10-B, in testimony Parcel Number 40.
Parcel Number 11-C, in testimony Parcel Number 41.
Parcel Number 11-D, in testimony Parcel Number 42.
Parcel Number 11-E, in testimony Parcel Number 43.
Parcel Number 11-F, in testimony Parcel Number 44.
Parcel Number 11-G, in testimony Parcel Number 45.
Parcel Number 12, in testimony Parcel Number 45.

Sixth—That the said order of confirmation contains a brief description of the property taken and reported upon.

Seventh—That said report also contains the amounts of compensation to be made by the owners of contiguous property for a grant or conveyance of the right, title and interest of The City of New York in and to those portions of the lands in front thereof, which formerly were embraced within the lines of the former Fort Washington Ridge road, as laid out by the Commissioners of Public Parks on their map dated and certified February 18, 1873, and filed in the office of the Register of the City and County of New York on the 7th day of April, 1873, and which were acquired by the Mayor, Aldermen and Commonalty of The City of New York in proceedings in which the report of the Commissioners of Estimate and Assessment was confirmed by an order of the Supreme Court on the 21st day of April, 1876, but which portions of the said Fort Washington Ridge road were not retained on the maps made and filed pursuant to chapter 114 of the Laws of 1892.

Eighth—That a brief description of these various properties is contained in the said report of the said Commissioners, and also in the order of the Supreme Court confirming the report, and these parcels have been subdivided in the report according to the ownership thereof of the contiguous property, so far as the same was ascertained by the Commissioners of Appraisal, as follows:

Parcel Number A, in testimony Parcel Number 1-X.
Parcel Number B-1, in testimony Parcel Number 2-X.
Parcel Number B-2, in testimony Parcel Number 3-X.
Parcel Number B-3, in testimony Parcel Number 4-X.
Parcel Number B-4, in testimony Parcel Number 5-X.
Parcel Number B-5, in testimony Parcel Number 6-X.
Parcel Number B-6, in testimony Parcel Number 7-X.
Parcel Number B-7, in testimony Parcel Number 8-X.
Parcel Number C-1, in testimony Parcel Number 9-X.
Parcel Number C-2, in testimony Parcel Number 10-X.
Parcel Number C-3, in testimony Parcel Number 11-X.
Parcel Number C-4, in testimony Parcel Number 12-X.
Parcel Number C-5, in testimony Parcel Number 13-X.
Parcel Number D-1, in testimony Parcel Number 14-X.
Parcel Number D-2, in testimony Parcel Number 15-X.
Parcel Number D-3, in testimony Parcel Number 16-X.
Parcel Number D-4, in testimony Parcel Number 17-X.
Parcel Number D-5, in testimony Parcel Number 18-X.
Parcel Number D-6, in testimony Parcel Number 19-X.
Parcel Number D-7, in testimony Parcel Number 20-X.
Parcel Number D-8, in testimony Parcel Number 21-X.
Parcel Number D-9, in testimony Parcel Number 22-X.
Parcel Number E-1, in testimony Parcel Number 23-X.
Parcel Number E-2, in testimony Parcel Number 24-X.
Parcel Number E-2, in testimony Parcel Number 25-X.
Parcel Number F-1, in testimony Parcel Number 26-X.
Parcel Number F-2, in testimony Parcel Number 27-X.
Parcel Number F-3, in testimony Parcel Number 28-X.
Parcel Number G, in testimony Parcel Number 29-X.
Parcel Number H, in testimony Parcel Number 30-X.
Parcel Number H-2, in testimony Parcel Number 30-X.
Parcel Number I, in testimony Parcel Number 31-X.
Parcel Number I-2, in testimony Parcel Number 31-X.
Parcel Number I-3, in testimony Parcel Number 31-X.
Parcel Number I-4, in testimony Parcel Number 32-X.
Parcel Number I-5, in testimony Parcel Number 33-X.
Parcel Number I-6, in testimony Parcel Number 33-X.
Parcel Number I-7, in testimony Parcel Number 34-X.
Parcel Number I-8, in testimony Parcel Number 35-X.
Parcel Number I-9, in testimony Parcel Number 36-X.
Parcel Number I-10, in testimony Parcel Number 37-X.
Parcel Number I-11, in testimony Parcel Number 38-X.
Parcel Number J, in testimony Parcel Number 39-X.
Parcel Number K, in testimony Parcel Number 40-X.
Parcel Number K-2, in testimony Parcel Number 40-X.
Parcel Number K-3, in testimony Parcel Number 41-X.
Parcel Number K-4, in testimony Parcel Number 42-X.
Parcel Number K-5, in testimony Parcel Number 43-X.
Parcel Number K-6, in testimony Parcel Number 44-X.
Parcel Number K-7, in testimony Parcel Number 45-X.
Parcel Number K-8, in testimony Parcel Number 46-X.
Parcel Number L-1, in testimony Parcel Number 47-X.
Parcel Number L-2, in testimony Parcel Number 48-X.
Parcel Number D-5, in testimony Parcel Number 18-X.
Parcel Number D-5, in testimony Parcel Number 18-X.
Parcel Number D-5, in testimony Parcel Number 18-X.

Ninth—That the said report also contains the names of the owners entitled to the awards made for the lands acquired in this proceeding, and the names of the owners of the contiguous property entitled to receive a grant from The City of New York of its interest in that part of the street which is not retained, so far as said ownership was ascertained by the Commissioners of Appraisal.

Dated BOROUGH OF MANHATTAN, CITY OF NEW YORK, October 25, 1904.

Yours, etc.,
JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon Row,
Borough of Manhattan,
New York City.

026,n10

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands and premises required for the construction of a NEW BRIDGE OVER FLUSHING CREEK, between Jackson avenue, in the former Town of Newtown, and Broadway, in the former Town of Flushing, in the Borough of Queens, City of New York.

PURSUANT TO THE STATUTES IN SUCH cases made and provided, notice is hereby given that an application will be made to the Supreme Court of the State of New York, Second Department, at a Special Term of said Court for the hearing of motions, to be held in the County Court-house, in Long Island City, in the Borough of Queens, in The City of New York, on Saturday, the 5th day of November, 1904, at the opening of the Court on that day, or as soon thereafter as counsel can be heard thereon, for the appointment of Commissioners of Estimate and Appraisal in the above-entitled matter. The nature and extent of the improvement hereby intended is the acquisition of title by The City of New York, for the use of the public, to all the lands and premises, with the buildings thereon and the appurtenances thereto belonging, required for the construction of a new bridge over Flushing creek, between Jackson avenue, in the former town of Newtown, and Broadway, in the former town of Flushing, in the Borough of Queens, City of New York, being the following-described lots, pieces or parcels of land, viz.:

PARCEL "A."

Beginning at the intersection of the bulkhead line and the northerly line of Jackson avenue; thence one hundred and twenty-six feet (126') along said northerly line of Jackson avenue; thence northerly thirteen and twenty-eight hundredths feet (13.28'); thence westerly one hundred and seventy feet (170') and thirty-five and thirteen hundredths feet (35.13') along the northerly line of Jackson avenue; thence easterly three hundred and twenty-seven and fourteen hundredths feet (327.14') to the bulkhead line; thence southerly along said bulkhead line thirty-four and sixteen hundredths feet (34.16') to the point of beginning.

PARCEL "B."

Beginning at a point in the southerly line of Jackson avenue distant forty-two and twenty hundredths feet (42.20') westerly from the bulkhead line; thence northerly thirty-seven hundredths feet (0.37'); thence westerly twenty-eight and ten hundredths feet (28.10'); thence southerly two and eighty hundredths feet (2.80'); thence easterly twenty-eight and twenty hundredths feet (28.20') to the point of beginning.

PARCEL "C."

Beginning at the intersection of the northerly line of Broadway and the bulkhead line; thence easterly one hundred and one and thirty hundredths feet (101.30'), thirty-one and fifteen hundredths feet (31.15') and forty-eight and forty-eight hundredths feet (48.48') along said northerly line of Broadway to the westerly line of Lawrence street; thence northerly fifteen and seven hundredths feet (15.07') along the westerly line of Lawrence street; thence westwardly two hundred and three and nineteen hundredths feet (203.19') to the bulkhead line; thence southeasterly twenty-five and three hundredths feet (25.03') and southerly forty-four and seventy hundredths feet (44.70') along said bulkhead line to the point of beginning, as shown on a map entitled "Map of Property Required for the Construction of Flushing Bridge." Dated New York, Borough of Manhattan, on the 30th day of November, 1903, and filed in the office of the Commissioner of Bridges of The City of New York and in the office of the Clerk of the County of Queens on the 2d day of December, 1903.

Dated NEW YORK, October 24, 1904.

JOHN J. DELANY,
Corporation Counsel,
No. 2 Tryon Row,
Borough of Manhattan,
City of New York.

024,n5

In the matter of the application of The City of New York, the successor of the Mayor, Aldermen and Commonalty of The City of New York, for the appointment of Commissioners of Assessment under chapter 339 of the Laws of 1892, an act entitled "An Act to regulate, improve and enlarge PARK AVENUE, above One Hundred and Sixth street, in The City of New York, and providing for the passage of the intersecting streets under the railroad structure of the New York and Harlem Railroad Company, and for the elevation of said railroad structure, and for changing the grade of said railroad, and for the construction of a new railroad bridge at an increased elevation over the Harlem river, and providing for all changes in any avenues, streets or railroads that may be necessary by reason of such change in structure and grade and increased elevation of bridge, and for other purposes," as amended by chapter 548 of the Laws of 1894, by chapter 594 of the Laws of 1896, and by chapter 613 of the Laws of 1898.

NOTICE IS HEREBY GIVEN THAT WE, the undersigned Commissioners of Assessment, appointed by the Supreme Court in the above-entitled special proceeding, did deposit on the 26th day of October, 1904, pursuant to section 17 of chapter 339 of the Laws of 1892, a true copy or transcript of our report herein, in the office of the Comptroller of The City of New York, for the inspection of whomsoever it may concern; and that said report will be presented to the said Supreme Court on the first Monday of December, 1904.

Notice is hereby further given that the statute permits any person or persons whose rights may be affected by said report, and who may object to the same or any part thereof, to set forth their objections to the same in writing to the undersigned Commissioners within thirty days after the first publication of this notice, which publication took place on the 27th day of October, 1904.

Dated NEW YORK CITY, October 21, 1904.

EDWARD LAUTERBACH,
Chairman.
MORRIS GUGGENHEIM,
FRANK BULKLEY,
Commissioners.

HERMAN J. KATZ,
Clerk.

027,d3

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands and premises required for the opening and extending of WOLCOTT AVENUE (although not yet named by proper authority), from the Boulevard to Purdy street, in the First Ward, Borough of Queens, in The City of New York.

WE, THE UNDERSIGNED, COMMISSIONERS of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office, No. 252 Jackson avenue, in the Borough of Queens, in The City of New York, on or before the 14th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 16th day of November, 1904, at 3 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings in the Law Department of The City of New York, No. 252 Jackson avenue, in the Borough of Queens, in said city, there to remain until the 25th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Queens, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at the point of intersection of the middle line of the blocks between Wolcott avenue and Winthrop avenue with the northwesterly line of Purdy street; running thence southwesterly along the northwesterly line of Purdy street to its intersection with the middle line of the blocks between Ditmars avenue and Wolcott avenue; thence northwesterly along the last-mentioned middle line of the blocks to its intersection with the southeasterly bulkhead line of the East river; thence northeasterly along the said bulkhead line to its intersection with the middle line of the blocks between Wolcott avenue and Winthrop avenue; thence southeasterly along the last-mentioned middle line of the blocks to the point or place of beginning; excepting from said area all streets, avenues and roads or portions thereof heretofore legally opened as such area is shown upon our benefit maps deposited as aforesaid.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 26th day of January, 1905, at the opening of the Court on that day.

Dated BOROUGH OF MANHATTAN, NEW YORK, October 17, 1904.

THEO. B. GATES,
Chairman;
WILLIAM J. KENNEY,
FREDERIC E. GUNNISON,
Commissioners.

JOHN P. DUNN,
Clerk. 022,n3

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening CLEVELAND STREET, between Pitkin avenue and New Lots road, in the Twenty sixth Ward, in the Borough of Brooklyn, in The City of New York, as the same has been heretofore laid out.

NOTICE IS HEREBY GIVEN THAT THE bill of costs, charges and expenses incurred by reason of the proceedings in the above-entitled matter will be presented for taxation to one of the Justices of the Supreme Court of the State of New York, at a Special Term thereof, to be held for the hearing of motions, at the Kings County Court-house, in the Borough of Brooklyn, in The City of New York, on the 9th day of November, 1904, at 10.30 o'clock in the forenoon of that day, or as soon thereafter as counsel can be heard thereon; and that the said bill of costs, charges and expenses has been deposited in the office of the Clerk of the County of Kings, there to remain for and during the space of ten days, as required by the provisions of section 999 of title 4 of chapter 17, of chapter 378 of the Laws of 1897, as amended by chapter 466 of the Laws of 1901.

Dated BOROUGH OF BROOKLYN, NEW YORK, October 25, 1904.

FRANK J. PRICE,
HARRIS G. EAMES,
WILLIAM L. PERKINS,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 025,n4

FIRST DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands, tenements and hereditaments, required for the opening and extending of EAST ONE HUNDRED AND SIXTY-NINTH STREET (although not yet named by proper authority), from Webster avenue to the Grand Boulevard and Concourse, in the Twenty-third Ward, Borough of The Bronx, City of New York.

WE, THE UNDERSIGNED, COMMISSIONERS of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office, Nos. 90 and 92 West Broadway, in the Borough of Manhattan, in The City of New York, on or before the 4th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 7th day of November, 1904, at 2 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings, in the Law Department of The City of New York, Nos. 90 and 92 West Broadway, in the Borough of Manhattan, in said City, there to remain until the 15th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of The Bronx, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point formed by the intersection of the westerly line of the New York and Harlem Railroad and the easterly prolongation of the middle line of that block between East One Hundred and Sixty-seventh street and East One Hundred and Sixty-ninth street lying west of Morris avenue; running thence westerly along said prolongation and middle line of the block and its westerly prolongation to its intersection with the easterly line of the Grand Boulevard and Concourse; thence northerly along said easterly line of the Grand Boulevard and Concourse to its intersection with a line parallel to and distant one hundred (100) feet south of the southerly line of East One Hundred and Sixty-eighth street; thence westerly along said parallel line to its intersection with a line parallel to and distant one hundred (100) feet west of the westerly line of Gerard avenue; thence northerly along said last-mentioned parallel line and along a line parallel to and distant one hundred (100) feet west of the westerly line of Jerome avenue to its intersection with the westerly prolongation of a line parallel to and distant one hundred (100) feet north of the northerly line of Clarke place; thence easterly along said prolongation and parallel line to its intersection with the easterly line of the Grand Boulevard and Concourse; thence northerly along said easterly line of the Grand Boulevard and Concourse to its intersection with the westerly prolongation of the middle line of the block between East One Hundred and Sixty-ninth street and East One Hundred and Seventieth street lying west of Morris avenue; thence easterly along said prolongation and middle line of the block and its easterly prolongation to its intersection with the westerly line of the New York and Harlem Railroad; thence southerly along said westerly line of the New York and Harlem Railroad to the point or place of beginning; as such streets are shown upon the final maps and profiles of the Twenty-third and Twenty-fourth Wards of The City of New York, excepting from said area all streets, avenues and roads or portions thereof heretofore legally opened as such area is shown upon our benefit maps deposited as aforesaid.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, First Department, at a Special Term thereof, Part III., to be held in the County Court-house, in the Borough of Manhattan, in The City of New York, on the 19th day of January, 1905, at the opening of the Court on that day.

Dated BOROUGH OF MANHATTAN, NEW YORK, August 17, 1904.

JOHN J. BRADY,
PIERRE G. CARROLL,
Commissioners.

JOHN P. DUNN,
Clerk. 015,n2

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands and premises required for the opening and extending of WILLIAM STREET (although not yet named by proper authority), from Graham avenue to Thirteenth street, in the First Ward, Borough of Queens, The City of New York.

WE, THE UNDERSIGNED, COMMISSIONERS of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office, No. 252 Jackson avenue, in the Borough of Queens, in The City of New York, on or before the 4th day of November, 1904, and that we the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 7th day of November, 1904, at 2 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings in the Law Department of The City of New York, No. 252 Jackson avenue, in the Borough of Queens, in said city, there to remain until the 15th day of November, 1904.

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of Queens in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point formed by the intersection of the southwesterly prolongation of the middle line of the blocks between the Crescent and William street with a line parallel to and 100 feet southwesterly from the southwesterly line of Thirteenth street; running thence northwesterly along said parallel line to its intersection with a line parallel to and 100 feet southeasterly from the southeasterly line of Ely avenue; thence northeasterly along said last-mentioned parallel line to its intersection with the middle line of the blocks between William street and Ely avenue and continuing northeasterly along said middle line and its prolongation to its intersection with a line parallel to and 100 feet northeasterly from the northeasterly line of Graham avenue; thence southeasterly along said parallel line to its intersection with the northeasterly prolongation of the middle line of the blocks between the Crescent and William street; thence northwesterly along said prolongation and middle line to the point or place of beginning; excepting from said area all streets, avenues and roads or portions thereof heretofore legally opened as such area is shown upon our benefit maps deposited as aforesaid.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, Second Department, at a Special Term thereof for the hearing of motions, to be held in the County Court-house, in the Borough of Brooklyn, in The City of New York, on the 19th day of January, 1905, at the opening of the Court on that day.

Dated BOROUGH OF MANHATTAN, NEW YORK, March 16, 1904.

AUGUST REYMERT, Chairman;
OWEN FITZPATRICK,
THOMAS B. SEAMAN, Commissioners.

JOHN P. DUNN,
Clerk. 015,n2

FIRST DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title, wherever the same has not been heretofore acquired, to the lands, tenements and hereditaments, required for the opening and extending of SHERIDAN AVENUE (although not yet named by proper authority), from East One Hundred and Sixty-fifth street to East One Hundred and Sixty-ninth street, in the Twenty-third Ward, Borough of The Bronx, City of New York.

WE, THE UNDERSIGNED, COMMISSIONERS of Estimate and Assessment in the above-entitled matter, hereby give notice to all persons interested in this proceeding, and to the owner or owners, occupant or occupants, of all houses and lots and improved and unimproved lands affected thereby, and to all others whom it may concern, to wit:

First—That we have completed our estimate and assessment, and that all persons interested in this proceeding, or in any of the lands, tenements and hereditaments and premises affected thereby, and having objections thereto, do present their said objections in writing, duly verified, to us at our office, Nos. 90 and 92 West Broadway, in the Borough of Manhattan, in The City of New York, on or before the 4th day of November, 1904, and that we, the said Commissioners, will hear parties so objecting, and for that purpose will be in attendance at our said office on the 7th day of November, 1904, at 3 o'clock P. M.

Second—That the abstract of our said estimate and assessment, together with our damage and benefit maps, and also all the affidavits, estimates, proofs and other documents used by us in making our report, have been deposited in the Bureau of Street Openings in the Law Department of The City of New York, No. 90 and 92 West Broadway, in the Borough of Manhattan, in said City, there to remain until the 15th day of November, 1904

Third—That the limits of our assessment for benefit include all those lands, tenements and hereditaments and premises situate, lying and being in the Borough of The Bronx, in The City of New York, which, taken together, are bounded and described as follows, viz.:

Beginning at a point formed by the intersection of the easterly line of the Grand Boulevard and Concourse with a line parallel to and one hundred (100) feet south of the southerly line of East One Hundred and Sixty-third street, running thence northerly along the easterly line of the Grand Boulevard and Concourse to its intersection with a line parallel to and one hundred (100) feet north of the northerly line of East One Hundred and Seventieth street; thence easterly along said parallel line to its intersection with a line parallel to and distant one hundred (100) feet east of the easterly line of Sheridan avenue; thence southerly along said line parallel to Sheridan avenue, to its intersection with the northerly prolongation of the middle line of the block between Sherman avenue and Grant avenue; thence southerly along said prolongation and middle line to its intersection with a line parallel to and distant one hundred (100) feet south of the southerly line of East One Hundred and Sixty-third street; thence westerly along said parallel line to the point or place of beginning, as such streets are shown upon the final maps and profiles of the Twenty-third and Twenty-fourth Wards of The City of New York, excepting from said area all streets, avenues and roads or portions thereof heretofore legally opened, as such area is shown upon our benefit maps deposited as aforesaid.

Fourth—That our report herein will be presented for confirmation to the Supreme Court of the State of New York, First Department, at a Special Term thereof, Part III., to be held in the County Court-house, in the Borough of Manhattan, in The City of New York, on the 19th day of January, 1905, at the opening of the Court on that day.

Dated BOROUGH OF MANHATTAN, NEW YORK, August 17, 1904.

JOHN J. BRADY,
PIERRE G. CARROLL,
Commissioners.

JOHN P. DUNN,
Clerk. 015,n2

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening and extending the approach to MANHATTAN BRIDGE (Bridge No. 3), as laid out by the Board of Estimate and Apportionment on the 29th day of May, 1903, in the Fourth, Fifth and Eleventh Wards in the Borough of Brooklyn, The City of New York.

NOTICE IS HEREBY GIVEN THAT WE, THE undersigned, were appointed by an order of the Supreme Court, made herein on the 25th day of June, 1904, and duly entered and filed in the office of the Clerk of Kings County, on the 27th day of June, 1904, a copy of which order was filed in the office of the Register of the County of Kings on the 15th day of July, 1904, and indexed in the Index of Conveyances in section 1, Blocks Nos. 107a, 107b, 118, 119, 120a, 120b, 132, 133; section 7, Blocks Nos. 2048a, 2048b, 2049, 2059, 2060a, 2060b, 2062, 2078, 2079a, 2079b, 2080, 2084a, 2084b, 2093a, 2093b, Commissioners of Estimate and Assessment for the purpose of making a just and equitable estimate of the loss or damage, if any, to the respective owners, lessees, parties and persons entitled to or interested in the lands and premises to be taken for the purpose of opening and extending the said approach, as particularly described in the petition of The City of New York, filed with said order in the office of the Clerk of the County of Kings and of performing the trusts and duties required of us by title 4 of chapter 17 of the Charter of The City of New York, and the acts or parts of acts supplementary thereto or amendatory thereof.

All parties and persons interested in the lands and premises taken or to be taken for the purpose of opening and extending said approach, or affected thereby, and having any claim or demand on account thereof, are hereby required to present the same, duly verified, to us, the undersigned Commissioners of Estimate and Assessment, at our office, in the Bureau of Street Openings of the Law Department, No. 166 Montague street, Borough of Brooklyn, in The City of New York, with such affidavits or other proofs as the said owner or claimants may desire, within twenty days after date of this notice.

And we, the said Commissioners, will be in attendance at our said office on the 21st day of November, 1904, at 3.30 o'clock in the afternoon of that day, to hear said parties and persons in relation thereto. And at such time and place, and at such further or other time and place as we may appoint, we will hear such owners in relation thereto and examine proofs of such claimant or claimants, or such additional proofs and allegations as may then be offered by such owner, or on behalf of The City of New York.

Dated BOROUGH OF BROOKLYN, THE CITY OF NEW YORK, October 25, 1904.

ARTHUR C. SALMON,
JOHN W. DEVOY,
THEODORE BURGMYER,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 025,n17

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening CRESCENT STREET, from Belmont avenue to a line about 190 feet 9 inches south of Blake avenue, in the Twenty-sixth Ward, in the Borough of Brooklyn, in The City of New York, as the same has been heretofore laid out.

NOTICE IS HEREBY GIVEN THAT THE bill of costs, charges and expenses incurred by reason of the proceedings in the above-entitled matter, will be presented for taxation to one of the Justices of the Supreme Court of the State of New York, at a Special Term thereof, to be held for the hearing of motions, at the Kings County Court-house, in the Borough of Brooklyn, in The City of New York, on the 9th day of November, 1904, at 10.30 o'clock in the forenoon of that day, or as soon thereafter as counsel can be heard thereon; and that the said bill of costs, charges and expenses has been deposited in the office of the Clerk of the County of Kings, there to remain for and during the space of ten days, as required by the provisions of section 999 of title 4 of chapter 17, of chapter 378 of the Laws of 1897, as amended by chapter 466 of the Laws of 1901.

Dated BOROUGH OF BROOKLYN, NEW YORK, October 25, 1904.

WM. O. CAMPBELL,
FRANK ANDERSON,
SIDNEY H. PALMER,
Commissioners.

JAMES F. QUIGLEY,
Clerk. 025,n4

SECOND DEPARTMENT.

In the matter of the application of The City of New York, relative to acquiring title to the lands, tenements and hereditaments required for the purpose of opening NINETEENTH STREET, from high-water mark to the bulkhead line, in the Eighth Ward, in the Borough of Brooklyn, City of New York.

NOTICE IS HEREBY GIVEN THAT, BY AN order of the Supreme Court, made and entered on the 2d day of June, 1904, the order confirming the report of the Commissioners of Estimate and Assessment, made and entered on the 12th day of June, 1903, was vacated in so far as the said order confirmed the assessments set forth in said report of said Commissioners of Estimate and Assessment, and that by said order, made and entered on the 2d day of June, 1904, the undersigned were appointed Commissioners of Estimate and Assessment for the purpose of making a just and equitable assessment of the benefit of said Nineteenth street, from high-water mark to the bulkhead line, in the Eighth Ward of the Borough of Brooklyn, City of New York, to the respective owners, parties and persons respectively entitled to or interested in the lands and premises and not required for the purpose of opening said street or avenue, but benefited thereby, and of ascertaining and defining the district benefited by said assessment and the extent and boundaries of the respective tracts and parcels of land participating in said benefit, and of performing the trusts and duties required of us by title 4, chapter 17 of the Charter of The City of New York, and the acts or parts of acts supplementary thereto or amendatory thereof.

All parties and persons interested in the lands and premises taken for the purpose of opening said street or avenue, or affected thereby, or in any wise affected or to be affected by the district of assessment for benefit in relation thereto, and having any claim or demand on account thereof, are hereby required to present the same to us, the undersigned, Commissioners of Estimate and Assessment, at our office in the Bureau of Street Openings of the Law Department, No. 166 Montague street, Borough of Brooklyn, in The City of New York, and we, the said Commissioners, will be in attendance at our said office on the 10th day of November, 1904, at 3.30 o'clock in the afternoon of that day, to hear the said parties and persons in relation thereto, and at such time and place and at such further or other time and place as we may appoint, we will hear such owners in relation thereto, and examine proofs of such claimant or claimants or such additional proofs and allegations as may then be offered by such owner or on behalf of The City of New York.

Dated BOROUGH OF BROOKLYN, CITY OF NEW YORK, October 17, 1904.

GEORGE G. REYNOLDS,
JOHN M. ZURN,
GEORGE W. PALMER,
Commissioners.

JAMES F. QUIGLEY, Clerk. 017,n2

PROPOSALS FOR BIDS AND ESTIMATES FOR THE CITY OF NEW YORK.

NOTICE TO CONTRACTORS.

GENERAL INSTRUCTIONS TO BIDDERS

The person or persons making a bid or estimate for any services, work, materials or supplies for The City of New York, or for any of its departments, bureaus or offices, shall furnish the same in a sealed envelope, indorsed with the title of the supplies, materials, work or services for which the bid or estimate is made, with his or their name or names and the date of presentation to the President or Board or to the head of the Department at his or its office, on or before the date and hour named in the advertisement for the same, at which time and place the estimates received will be publicly opened by the President or Board or head of said Department and read, and the award of the contract made according to law as soon thereafter as practicable.

Each bid or estimate shall contain the name and place of residence of the person making the same, the names of all persons interested with him therein, and, if no other person be so interested, it shall distinctly state that fact; also, that it is made without any connection with any other person making an estimate for the same purpose, and is in all respects fair and without collusion or fraud, and that no member of the Board of Aldermen, head of a department, chief of a bureau, deputy thereof, or clerk therein, or other officer of The City of New York is, shall be or become interested, directly or indirectly, as contracting party, partner, stockholder, surety or otherwise in or in the performance of the contract, or in the supplies, work or business to which it relates, or in any portion of the profits thereof. The bid or estimate must be verified by the oath, in writing, of the party or parties making the estimate that the several matters stated herein are in all respects true.

Each bid or estimate shall be accompanied by the consent, in writing, of two householders or freeholders in The City of New York, or of a guaranty or surety company duly authorized by law to act as surety, and shall contain the matters set forth in the blank forms mentioned below.

No bid or estimate will be considered unless, as a condition precedent to the reception or consideration of any proposal, it be accompanied by a certified check upon one of the State or National banks of The City of New York, drawn to the order of the Comptroller, or money to the amount of five per centum of the amount of the bond required, as provided in section 420 of the Greater New York Charter.

The certified check or money should not be inclosed in the envelope containing the bid or estimate, but should be either inclosed in a separate envelope addressed to the head of the Department, President or Board, or submitted personally upon the presentation of the bid or estimate.

For particulars as to the quantity and quality of the supplies, or the nature and extent of the work reference must be made to the specifications, schedules, plans, etc., on file in the said office of the President, Board or Department.

No bid shall be accepted from or contract awarded to any person who is in arrears to The City of New York upon debt or contract, or who is a defaulter, as surety or otherwise, upon any obligation to the City.

The contract must be bid for separately.

The right is reserved in each case to reject all bids or estimates if it is deemed to be for the interest of the City so to do.

Bidders will write out the amount of their bids or estimates in addition to inserting the same in figures.

Bidders are requested to make their bids or estimates upon the blank forms prepared and furnished by the City, a copy of which, with the proper envelope in which to inclose the bid, together with a copy of the contract, including the specifications, in the form approved by the Corporation Counsel, can be obtained upon application therefor at the office of the Department for which the work is to be done. Plans and drawings of construction work may also be seen there